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ABSTRACT

This curriculum guide presents documentation of development of a holistic approach to curricula in science, art, humanities, and environmental education for the secondary school level. The outgrowth of this curricula development was the integration of these disciplines into a "life systems" curriculum involving an interrelated teaching approach. The curriculum was implemented in a private school using a tri-mester program. Adaptation to public school schedules should not be difficult. (RE)

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PROGRAM DIRECTOR'S INTRODUCTION

Environmental education is all too often relegated to the study of "nature" and introduced to students as another subject to be mastered much as a foreign language or advanced algebra. Little or no consideration is given to a systemic perspective which reveals the interactions of biosphere and ethosphere. This preliminary curriculum guide represents the documentation of a year in the life of the Woodstock Country School during which the faculty, students, and administration made a conscious effort to introduce an holistic point of view (in which culture, economics, politics, and environment are integrated) into each of the three major divisions of the school: Humanities, Arts, and Sciences. This attempt had as its nexus the Life Systems Program.

The curriculum guide that we have prepared is preliminary in more than just the sense of being introductory and incomplete. The nature of teaching at Woodstock is fluid, and even a course which has been taught for years continues to evolve. No bibliography, or list of course objectives, can be considered the final one, although of course the experience of one year is

used the next. But the list of courses offered may vary greatly each year, and the reading lists for those courses which are offered each year change with the shifts in focus of the teacher.

We are confident that in spite of the above caveat, the guide will be of value in several ways. Although there are many environmental education programs which address specific issues such as land use, energy, and futures planning, there is no curriculum guide available which points the way to infusing courses in other fields with an environmental perspective and a systems approach to thinking. We do not think we exaggerate the need for such a comprehensive program; nor is it merely trendy. The survival of the biosphere as we know it depends on a perspective which links decision making to effects that are displaced in time and space, and which connects the life of the individual with the problems of the world.

The value to other schools, then, will be in using this guide as a "cookbook" for the development of a Life Systems Program. As with all recipes, the cook must be creative in making appropriate modifications. Naturally, the value to Woodstock Country School was in having had the opportunity to document this year of exploration and with this solid map, review, change, delete, and expand our program. The Educational Development Center has written, in its publication, Growth

Implications and the Earth's Future (Boston, 1976), "The real task, after all, is an enormous one . . . it involves changing the way students think, from a linear exploration of single factors to a systematic exploration of a web of factors and the way the factors interrelate" (p. 120). They might well have said "people" instead of "students".

The Woodstock Country School, founded in 1945, is a private secondary boarding school with an enrollment of approximately 95 students and a student-faculty ratio of about 6:1. Located in central Vermont, the school has the advantage of a 300 acre campus that includes flood plain and streams, woodlots, meadows, a marsh, a pond, and a waterfall, as well as the potential for a working farm. Our school has an ideal setting for an extensive exploration of natural environments, hands-on work, and the freedom to quickly shape the curriculum to meet the evolving needs of the student body.

Adaptation of the Woodstock Country School model to urban schools should not be difficult. The city-based class may not have ready access to a marsh, but can take a trip to a garbage disposal facility, discuss the relationship of insect populations to waste products, and, indeed, become aware that in the city, one component of the producer-consumer-decayer

cycle is missing: this opens the door to endless discussions of the interdependence of biosphere and ethosphere. The classroom which is tied to a tight syllabus will, whether in city or country, have a more difficult time introducing a Life Systems Program. The program is based on learner-directed inquiry, creative teaching, and active learning. It is our hope that those students who continue their education in specialist fields will have been inspired to bring the generalists' broad spectrum of concerns to all facets of their lives and work.

In the fall of 1977 the current director of the Life Systems Program joined the school. The following has been excerpted from a paper she wrote when proposing the program to the Headmaster:

> My fantasy for the Woodstock Country School is a community which develops its own sources of food and energy, building its devices, repairing them when they break down, understanding and indeed, delighting in their idiosyncracies and limitations. I am not a "Flat earth-er", nor do I long for a return to the 18th century. What I am proposing is a learning center in which the community can become familiar with renewable sources of energy and also develop certain food and shelter systems which will promote community self-sufficiency, individual self-reliance and a sense of grace and ease in relation to the physical world. . . . Let me emphasize that I give equal weight to aspects of social as well as technical ecology. I would like to encourage the community toward a sense of proportion and a rational expectation of what can be achieved with appropriate technology. . . . it means

> complexity of living patterns and a close examination of contexts to arrive at a variety of solutions. . . . So I would like to see a plan developed that would integrate much of the school's expertise in a program of Life Systems. Courses in physics might include exercises in the electronics of windmills, and problems in algebra could be based on R factors. A course in evolution might permit interested students to take a close look at the "green revolution" and the results of extreme hybridization of food stocks.

It rapidly became apparent that the Life Systems Program should be more than a plan for increasing the school's self-reliance in food and energy. In fact, before it would be possible to initiate a plan for self-reliance, it would be necessary to create a climate: an awareness, on the part of all participants in the community, of the underlying reasons for such a program, and how Woodstock Country School reflected in microcosm a world in which the end of the energy "free-lunch" would impinge on every aspect of their lives.

The emphasis on environmental education and self-reliance was not new to the school; throughout the preceding years sporadic attempts had been made to utilize the farm potential of the school. A strong faculty in physical sciences in the early 1970's had initiated a bird banding station and a water analysis center at the school which were also resources for

the larger community. The bird banding station is still in use. Farm-school involvement dropped off in the early '70's and had become a token gesture by 1977. No attempt was made to integrate an holistic point of view into the curriculum, and environmental education remained confined to the science department with rare exceptions.

The goal of the Life Systems Program has been to expand the environmental education courses offered at the school, while at the same time infusing an holistic, systemic perspective into courses in other fields. Our hope is that even if a student never takes a science course at Woodstock Country School (many of our students transfer to the school in their junior and senior years), they will not graduate without having been exposed to, and asked to consider, environmental issues.

The natural sciences lend themselves most readily to systems thinking; it is not as readily apparent that this can be carried over into a course in painting or literature. However, exercises in color can yield the information that in painting as well as ecology "you can't do just one thing": each color as it is applied changes the effect of those which went before.

In addition to expanding the experiential course offerings, courses in the regular curriculum were identified

that seemed to be susceptible to an holistic approach without radically changing the nature of the course. The degree to which an holistic point of view, or a systematic approach to a subject, were integrated into each course depended to a great extent on the background and point of view of each faculty member involved in the program. Some had reservations that the subject matter and a scholarly approach might be diluted by engaging in too broad an exploration of context. The course selection was developed during a vacation period, and some of the faculty involved had no direct input in the process, although all had been introduced to the general goals of the program the preceding term. We tried not to include any teachers who had expressed reservations about their possible involvement.

The problems encountered by the Life Systems Program in the course of the year were those that attend any shift in direction of this scope: misunderstanding of the nature of the program on the part of faculty and students (and indeed, the message still requires constant reiteration), inadequate communication, and resistance to change. In addition, the special nature of Woodstock Country School lent its own flavor to the year. All teachers at Woodstock Country School are traditionally responsible for, and guard the prerogative of, developing their

own courses. This is not antithetical to the goals of the Life Systems Program, but meant that the resource materials in the Life Systems Program vertical files remained unexplored by some, and that tact and patience will be necessary before all faculty are able to see the environmental implications in their specialties.

It would be some kind of miracle if in a year's time a community of approximately 120 people were to turn into systems analysts and ecologists. The steps taken at Woodstock Country School toward this illusory goal were preliminary; the steps taken were concrete, and philosophical and emotional as well as intellectual. They will be the basis of next year's work in interdisciplinary classes, teaching from an expanded view, and for a major effort toward food, energy, and shelter self-reliance.

Each school that wishes to develop or modify its program in environmental education will evolve its own process and content, based upon the context of the school; we hope this preliminary guide will be of help as a resource material. We feel that our work at Woodstock Country School is strengthened by the links we have with other institutions and individuals

working toward goals similar to our own, and would appreciate your comments and suggestions or inquiries.

Janet Van Sickle

Director, Life Systems Program

DOCUMENTOR'S INTRODUCTION

ORGANIZATION

The curriculum of the Woodstock Country School is organized on a trimester basis, and many courses change each term. The curriculum of this year's Life Systems Program was interdisciplinary, and included courses taught in the Humanities, Science and the newly-formed Whole Life Skills Divisions. Life Systems courses were those which lent themselves to a systems approach to subject matter - either implicitly or explicitly. No one was asked to impose a systems approach on their subject.

This curriculum guide is a working guide. The information presented has been taken from trimester course descriptions, interviews with faculty, samples of student work, sample tests and course evaluations, and bibliographies. The content is meant to provide concrete information, as well as to convey the evolution of faculty considerations during the year.

Each section of the guide is organized by division and, within that, by trimester. Courses which change each term - Fall, Winter, and Spring - are described first, and full-year

courses follow. The material collected around any one course varies, according to what was available for collection from faculty and what was possible within the confines of the documentor's time. Hence what is diverse for a preliminary guide could be more uniformly presented in a more complete version. Student papers are presented entirely uncorrected for spelling and grammatical errors.

What follows are charts of Life Systems courses offered each trimester. Summer term was offered as a pilot program this year, and was not included in the documentation process. A brief outline of the program is appended.

Corinne B. Hyman
Documentor, Life Systems Program

LIFE SYSTEMS COURSES

Fall Term

Whole Life Skills

Fall Gardening

Sciences

Basic Field Ecology
Botany
Entomology

Humanities

American Literature
Early Man
The 1920's
The Social Self
Utopias and Alternative Futures

Winter Term

Whole Life Skills

Self-Sufficiency

Sciences

Environmental Design
Winter Natural History

Humanities

The Civil War
Early Culture
The U.S. in an Interdependent World

Spring Term

Whole Life Skills

Homesteading
Spring Gardening

Sciences

Field Ornithology
Watershed Ecology
Wild Plants

Humanities

A History of Vermont

Full Year Courses

Whole Life Skills

Carpentry
Sheep to Shawl
Structures
Woodworking

Sciences

Eastern Mind, Western Science
Physics: Energy

Humanities

Colloquium on Strategic Arms Control

Art

Weaving

FALL TERM - Single Term Courses
WHOLE LIFE SKILLS

FALL GARDENING

This course combined field work and a study of the relationship of agriculture to society. The field work included the harvest and storage of crops and the preparation of the garden for spring planting. The class worked outdoors as long as weather permitted, preparing adequate amounts of compost for spring, flats for later winter and early spring sowing, and beds for spring planting of perennials.

Excerpts from Teacher Interview

Autumn gardening has meant getting as much shape in the garden as possible in preparation for next spring, including composting. It's harder to use a systems concept in certain types of gardening. In the fall there's no completion, but in the spring you're sowing seeds, preparing flats; seeds sprout, and you take into consideration what part of the garden to put them in by considering light and shade. This way a system develops from which you can organically develop a gardening class. So for the fall, the paperwork part of the course has to provide

Excerpts from Teacher Interview, continued

the systems approach. We're planning a garden community within the school community, and they are having to think very systematically about what this community will need to survive on the land.

A Selected Bibliography

Berry, Wendell. The Unsettling of America: Culture and Agriculture. San Francisco: Sierra Club Books, 1977.

Hertzberg, Ruth, et al. Putting Food By. Brattleboro, Vermont: Stephen Greene Press, 1975.

Jeavons, John. How to Grow More Vegetables. Palo Alto, California: Ecology Action of the Mid-Peninsula Press, 1974.

Merrill, Richard, ed. Radical Agriculture. New York: Harper Colophon Books, 1976.

Class Objectives

Field Work

1. Prepare the beds for spring planting -
   A. Reshape old beds.
   B. Shape new beds.
   C. Mulch perennials and other beds.
2. Prepare compost for spring or summer use.
3. Test soil for nutrient deficiencies.
4. Harvest and put by any greens and tomatoes (in conjunction with activity).
5. Plan spring garden - coordinate with cook and farmer.
6. Locate potential garden space up the hill for longer season crops and warmth-lovers.
7. Collect and store enough leaf mold and top soil for spring flats.

Classroom Work and Out-of Class Reading

1. Understanding the basic nutrient requirements of plants.
2. Understanding the relationship of energy in, energy out.
3. Understanding the relationship of culture and agriculture.
4. Individual projects.

Teaching Notes

The Unsettling of America

Preface -

Orthodox agriculture - define:
Immense tracts of land devoted to monoculture, fertilized with chemicals, on which chemical pest and weed controls are used routinely. Use of large machinery to cultivate, plant and harvest. The assumption that technological additives are improvements, that farm populations are subsidiary to production and can become "surplus".

"Who so hath his mind on taking, hath it no more on what he hath taken." Montaigne, III: IV.

Chapter 1

a) Conquest mentality that prevailed in the settling of this continent. A mixture of fantasy and avarice.
b) Counterbalance of those who wished to stay put.
c) The succession of interest groups:
Indians
Colonists
Independent landowners
Industrial society
The fur trade was only the first establishment on this continent of a mentality whose triumph is its catastrophe.
d) The expert vs. the generalist

characteristics of the exploiter
Characteristics of the nurturer
parallels in fields of endeavor other than agriculture - i.e., medicine, housing, law.

ancient associations around food
contemporary associations around food

Question - will the continued programs of industrialization ultimately cause more starvation than they can remedy?

Teaching Notes, continued

Escalation of methods necessary to produce yields.
Energy in, energy out.

The paradoxes in our culture - p. 12:
- environment
- social conditions - character
- work
- luxury

The ambition of permanence - everyone a land-holder. What are the contemporary possibilities of substituting other mechanisms than farm land to provide a sense of eikos to everyone?

Student Outline for Fall Gardening Project
Designing a Self-Reliant Community of Fifteen People
Focus on Garden

The community will require:

1. Garden
2. Shelter
3. Food Storage
4. Population 15
5. Tools
6. Animals
7. Barn
8. Greenhouse
9. Outhouse
    1. Irrigation System
    2. Underground cabin, ark big enough to house 15
        kitchen common room dining area
        fireplaces - cookstove (& heat) - canning area
        7 bedrooms - well pump indoors
    3. Root cellar (see attached), drying facilities
        canning storage
    4. Hard workers, responsible, willing to live simply
        cooperate, vegetarian (mostly), hardy, not squeamish
        No sexism, no racism
        male or female chauvinists need not apply
    5. Drying, canning, and gardening
    6. To be continued -

YIELD NEEDED TO FEED A COMMUNITY OF 15 (continued on following page)

Vegetable	One Person	Yield per 100 Feet	15 People
Corn	50 ears	100 ears	750 ears
Potato	100 lbs.	75 lbs.	1,500 lbs.
Sweet Potato	20 lbs.	100 lbs.	300 lbs.
Tomato	30 lbs.	200 lbs.	450 lbs.
Lettuce	50 lbs.	50 lbs.	750 lbs.
Carrots	20 lbs.	100 lbs.	300 lbs.
Winter Squash	20 fruits	100 fruits	300 fruits
Cauliflower	6 heads	45 heads	90 heads
Cucumber	20 lbs.	150 lbs.	300 lbs.
Eggplant	50 fruit	125 fruits	750 fruits

Student Outline for Fall Gardening Project, continued

Total Number of Beds/Feet Needed to Feed 15

Corn	7.5 100 foot rows
Potato	20 20x5 beds
Sweet Potato	3 20x5 beds
Tomato	2.25 20x5 beds
Lettuce	15 20x5 beds
Carrots	3 20x5 beds
Winter Squash	3 20x5 beds
Cauliflower	2 20x5 beds
Cucumber	2 20x5 beds
Eggplant	6 20x5 beds
	63.75 beds or 6375 feet

Amount of Various Vegetables by a Community of 15 People

Vegetable	Spacing	#Of Beds Needed
Summer Squash	18"/15" apart	3
Beets	3" apart	1
Turnips	3" apart	2
Chinese Cabbage	10"	1½
Cabbage	12"/15" apart	4
Broccoli	12"/15" apart	75 plants
Spinach	2" apart	1
Brussel Sprouts	18" apart	3

Sunflowers (plant near corn - interplanting)

Food Storage

The root cellar:

This root cellar will be dug into the hillside of Buffy's Hill. It will have a floor measuring 12 x 16 feet, since this is what 15 people would require. The concrete block structure will be banked with earth on three sides, while the roof and entranceway will be exposed. The roof should be wood-framed with asbestos shingles. Inside, the cellar will be insulated with a 2 inch foam, the ceilings having 8 inches of poured in-

Student Outline for Fall Gardening Project, continued

sulation. The door will be doubled and will have 2 inch insulation

It will be divided into two rooms with a partition in between which will also be insulated to keep the inner room from freezing in the coldest weather. This inner room will hold 120 bushels of fruits and veggies and the temperature here should remain stable with the partition and double doors, but the outer room's temperature will fluctuate.

The temperature of the cellar must be checked everyday in the winter and if it drops below 20°, a small amount of heat must be supplied. A kerosene lantern would be sufficient in cases like this. The floor of this structure whould be lined with wire mesh and concrete slats to keep rodents from digging their way in.

A big, important factor that has to be considered in a good root cellar is proper ventilation. The vegetables and fruits will be stored in apple crates kept off the floor for air circulation. Packing these things with hay, straw, crisp dry leaves or sphagnum moss will also help store them with less chance of spoilage. The root crops will be stored in wooden bins in the inner room, 4 inches off the ground; each bin divided into 3 sections - each holding about 75 lbs. of fruit and vegetables.

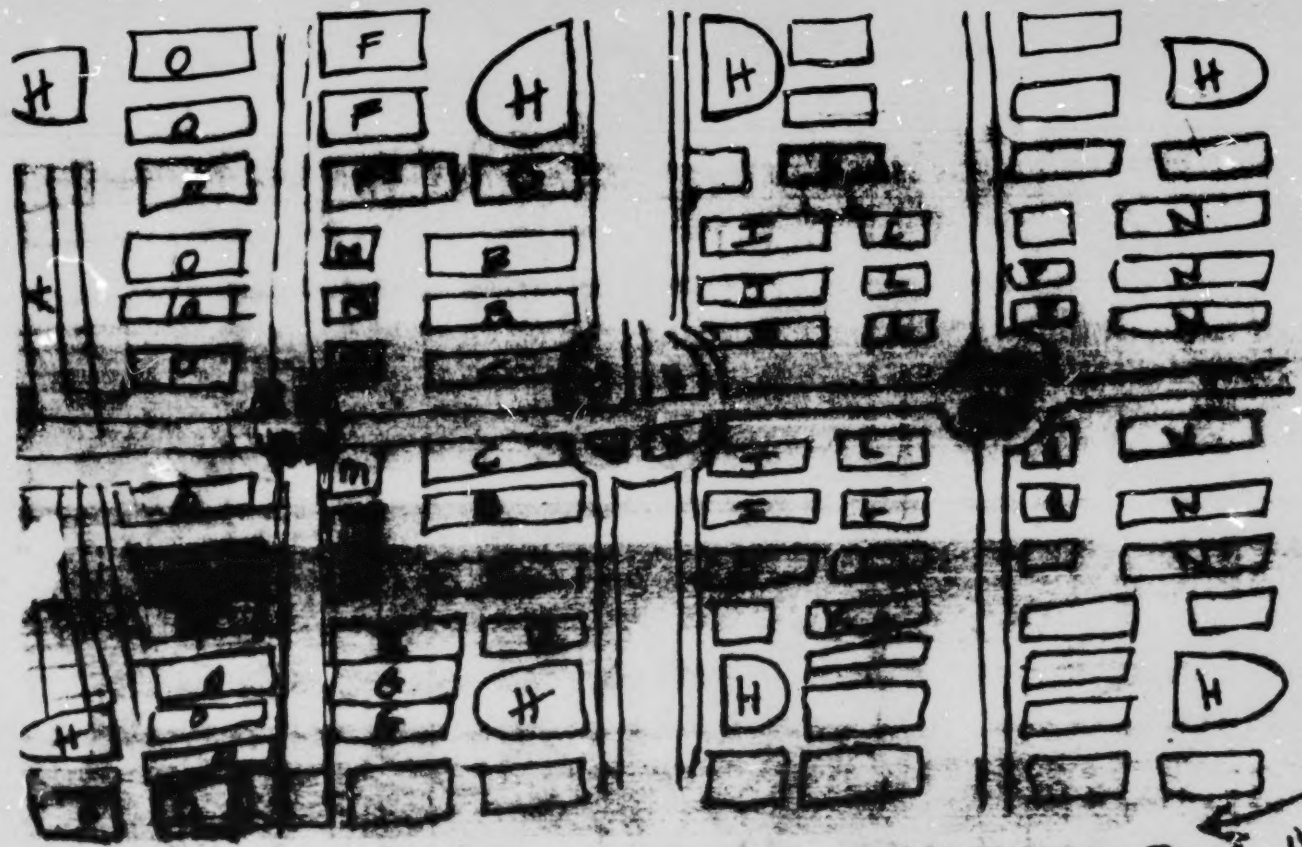
The temperature of this root cellar should be near 32° - freezing point of water.

The food dryer:

Dried food conserves storage space - 5 lbs. of fruit will amount to about one lb. of dried fruit. We will be drying apples, pears, and peaches, and the vegetables will be beans, cabbage, carrots, corn, squash, spinach, and tomatoes. The potatoes and other root vegetables will be stored in the root cellar. Our herbs can also be stored in the dryer.

The dryer will consist of a cardboard box with a light bulb in it for heat. If the fruit or vegetables can be cut into strips, they can hang over the dowels, which will hang across. If they can not be hung, shelves with baking sheets will be installed in this box. The box should be about 24 inches by 32 inches.

GARDEN ON BUFFY'S HILL



APP. 57 BEDS TOTAL (NOT INCLUDING POTATOES)

POTATOES DOWN BELOW (23 BEDS 20x5)

KEY:

A) CORN AND SUNFLOWERS ~~BORDER~~ ROWS

B) CABBAGE

C) CAULIFLOWER

D) CHINESE CABBAGE

E) ~~BROCCOLI~~ ~~BRUSSEL~~ SPROUTS

F) BRUSSEL SPROUTS

G) TURNIPS

H) FLOWERS AND HERBS

I) SUMMER SQUASH

J) WINTER SQUASH

K) CUCUMBERS

L) POTATOES

M) CARROTS

N) EGGPLANT

O) LETTUCE

P) BEETS

Q) SPINACH

Walk beds 2 B) C) E) G) I) J) N) O)

Half beds 20x5 D) L) M) P)

Herb Beds Vary

Corn 7.5 Apart Rows

23

24

25

FALL TERM - Single Term Courses
SCIENCES

BASIC FIELD ECOLOGY

Basic Field Ecology was designed as a beginning course in ecology using the outdoors as the laboratory for investigations of such topics as communities, populations, the ecosystem, energy flow, nutrient cycles, and the relationships between people and the environment.

The course began with an emphasis on an active participation with the natural world. The teacher encouraged the students to use their senses of smell, touch, and hearing as their means of exploration. He then moved from the experiential to more structured classes using a text. He engaged in discussions and exercises which helped students clarify what they wanted to get out of a basic ecology course. The focus then became the students' decisions and whatever projects they elected to carry out. The term ended with project presentations to the class.

Excerpt from Teacher Interview

The course is designed as much to how people make decisions as it is to ecology. It's meant to increase their awareness, to take a more holistic outlook on their environment and their lives.

A Selected Bibliography

Primary Text:

Mariner, James L. Understanding Ecology. Wellesley Hills, Massachusetts: Independent School Press, 1975.

Secondary Text:

Cairn, John, Jr. Population Dynamics. Chicago: Rand McNally & Co., 1965.

Reference:

Andrews, William A., series editor. A Guide to the Study of Terrestrial Ecology, 1974, A Guide to the Study of Freshwater Ecology, 1972, and A Guide to the Study of Soil Ecology. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.

Ralph Buchsbaum, Ph.D., and Mildred Buchsbaum, M.S., Basic Ecology. Pittsburgh, Pennsylvania: The Boxwood Press, 1957.

Hylander, Clarence J. Wildlife Communities. Boston: Houghton Mifflin, 1966.

Smith, Robert L. Ecology and Field Biology. New York and London: Harper & Row Publishers, 1966.

Van Matre, Steve. Acclimatization. Martinsville, Indiana: American Camping Association, 1972.

Sample Student Paper

My name is Andy, I am an ant a worker ant to be exact. I live underground with 1500 other ants and we all work together to survive and perpetuate the species. My job is to fee and care for the larvie and pupae, I don't have to go out and get food, other workers regurgitate food to me. Another colony of much smaller ants lives down here with us, they steal our food and larvie and escape into their own smaller tunnels. Also living down here with us are some slave ants, they do a lot of work. They are ants of another species which we got by raiding their colony and taking them as larvie. A good number of non-ants live down here with us too, mostly beetles. We help each other mostly, but sometimes they eat us.

Man not only likes us but even protects us because we eat the noxious insects that invade the forest we live under. Humans have passed laws to protect us and even plant colonies in certain areas. My cousin, who came over from America on a ship, says that in America people try to kill ants with poisons; that's why he left.

Ant colonies consist of workers like me, queens who found colonies, and lay eggs, and soldier ants. We all have our individual tasks which helps us survive.

Sample Student Paper: Migration of Birds

Migration is the periodic journey of an animal from one region to another and the eventual return to the original area. The animals' need for migration has evolved basically from the periodic change in environment (i.e. the seasons) affecting food supply, weather conditions, and the concentration of predators. Some animals travel from one place to another and don't make a return trip - this is known as an emigration.

The characteristics of migration vary from species to species. The migratory cycles of most birds consist of an outward journey and a homeward journey occurring in the course of a year - an annual cycle. But other birds make three trips a year - certain ducks breed in the north, come south to moult, and then move even further south for the winter.

Sample Student Paper: Migration of Birds, continued

There have been a lot of experiments conducted on migration to try to determine what initiates it and what guides the animal along its route. Countless theories have been formulated that present possibilities as to what's responsible, but most of them have been disproved.

There have been a few theories formulated concerning the initiative factors that have been supported through experimentation. These theories currently serve to provide us with some sort of concrete concept of this natural phenomenon. It has been established that birds have an internal clock which somehow keeps track of time. The way the bird can do this hasn't been definitely established but experiments have found correlations between light, the effects it has on certain hormones, and the effects these hormones have on the bird's urge to migrate. These gonadotropic hormones, secreted by the bird's pituitary gland, are stimulated by different amounts of light - birds who migrate in the fall are affected by less and less light, birds who migrate in the spring are affected by more and more light. These hormones are responsible for the building up of the bird's fat which serves as fuel for its journey.

There has been more inquiry into how birds find their way than why they go - their precision has really had scientists intrigued. Possible factors that have been tested but disproved include terrestrial magnetism, electromagnetic radiation, change in temperature, and even change in the color of the leaves. The theory that has been accepted by science is that birds determine their flight route by their positioning in relationship to the sun - called a "sun compass sense".[1] Experiments where birds have been placed in totally different conditions during the time they would normally be migrating is different sun positioning, different length of days, etc. - and they've been confused, which supports the sun compass theory. But there are a lot of species that migrate solely at night, so obviously that theory can't account for their navigational methods. The theory regarding these species is that they rely upon the constellations as a guide. These two theories are the ones found in the resources I've used, but only one of these presents the conflicting factors. These factors include varying weather conditions (affecting visibility, etc); the evidence that birds are totally unaffected by the absence of the planets and certain stars, the intense sensitivity the bird must have to compensate for the daily changes in the positions of the celestial bodies, etc. One resource went as far as to say "...the mechanism of migration as it occurs is open to experimental solution... the sense of direction should also be open to scientific analysis

1. pg. 21, Atlas of Animal Migration

Sample Student Paper: Migration of Birds, continued

although no attempts at elucidation have hitherto borne fruit."[2]

Another theory which was introduced to me recently by a friend who had read an article on the subject, is that birds can determine their direction by their relative positioning to the ocean. According to this theory birds can hear the oceans and thus uses them as a guideline to base their routes on.

The indecisive nature of the information available on migration leads me to believe that we really aren't sure of what the whole thing's about. The reasons why migration occurs are fairly obvious (sort of a survival device for the birds), but the controlling factors are extremely obscure and thus hard to define. Scientists have devoted a lot of energy to determining these factors and they have formulated a few applicable theories. But there are still a lot of birds that use yet-to-be-determined means to navigate their migratory routes - which keeps the scientists busy. Oh well, migration is just one of those phenomenon that instills a sense of humility in our attitude towards the environment.

2. pg. 640; vol. 3, Encyclopedia Britannica

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Rowan, Wm., Migration of Birds, Encyclopedia Brittanica, Vol. 3, pgs. 637-640; Benton 1962; c. 1961.

Sample Student Paper

In North America tundra soils are common. The vegetation is mostly small plants such as Moss, lichens, small shoots and weeds. and because its really flat theirs not much drainage. Permafrost freezes fairly close to the surface of the ground preventing water to seep down in the ground or "Leaching" which

Sample Student Paper, continued

often makes a "Peaty" layer of soil on top.

Down south where theres more water and less permafrost (Occurs in much lower layers). which alows the cemicals to be "Leached" away from the surface layers. The accumulation of organic debris produces an acidic soil wich fungus just loves.

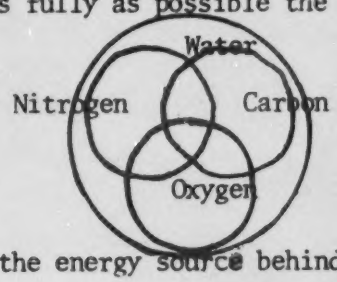
In the tundra of the Arctic the drainage is poor because the melting snow cannot sink below the permafrost so it settles in lower depresions with thick mats of mattireal full of roots, moss, stems, twigs, form marshes and bogs.

In the summer the upper root layers thaw.

Further south of the tundra permafrost is nonexistant.

Sample Test

1. Define, or explain and exemplify, 12 (twelve) of the following terms.
   - ecology
   - photosynthesis
   - decomposers
   - ecological equivalents
   - 2nd order consumers
   - omniverous
   - ecological niche
   - ecological dynamic equilibrium
   - water cycle
   - autotrophic
   - biosphere
   - community
   - mutualism
   - abiotic factors
2. What is the relationship between the fossil fuels used today by people in industry and home, and the fuels with which we feed our bodies?
3. Discuss the ecosystem as a concept and as an actual area. What is it, how does it work, and what is it made up of?
4. Explain as fully as possible the following:



What is the energy source behind it all?

Sample Test: Relationships

Go outside and find two things preferably and one thing for sure that are involved in an ecological relationship. Bring them or it back and be able to tell the type of relationship.

Field Trips

Fresh water sphagnum bog (to show adaptation to specialized habitats: food webs, methane production, aerobic decomposition)

Beaver ponds (to sharpen sense of adaptation mechanisms, points of view -)

Blind walks

See Acclimatization (see bibliography) for ecology games for students.

BOTANY

Botany was a laboratory course covering the green plant cell, plant anatomy, plant reproduction, photosynthesis, plant growth, plant evolution, and the relationship between people and plants.

The teacher felt this course was a straightforward presentation of botany. However, in format, the emphasis was more on lab work than on use of the text. As he described it:

Excerpt from Teacher Interview

...we did experiments, then wrote up what we'd learned from them, and then we read about what should have happened. I've always wanted to do a course that way...

A Selected Bibliography

Primary Text:

Galston, Arthur W. Life of the Green Plant, Part 3. Englewood Cliffs, New Jersey: Prentice Hall, 1968. Foundations of Biology Program, William D. McElroy and Carl P. Swanson, Editors.

Reference:

Biological Sciences Curriculum Study. Biological Science, Molecules to Man. Boston: Houghton Mifflin, 1968.

Scientific American.

Sample Test

1. Define or explain and exemplify as fully as possible 9 (Nine) of the following:
   - cross pollination
   - complete flower
   - pollen grain
   - spore
   - archegone
   - gametrophyte
   - vernalization
   - long day plants
   - florigen
   - endogenous
   - circadian rhythms
2. What has the culture of excised roots, stems and leaves taught us about plant morphogenesis?
3. Explain alternation of generations of either the moss or fern plant. Diagrams will help. Why are each of these usually found in moist areas?
4. Explain the pollenation and seed and fruit production of a flowering plant. Be as specific as possible.
5. Why is the cocklebur a good plant to use in experiments?
6. What are the basic steps in the flowering of a plant?
7. How does photoperiodism limit the range of a plant species?

Sample Test

1. Describe a typical seed (diagrams may help). Use such terms as endosperm, hypocotyl, epicotyl, and cotyledons, among others. What happens when a seed begins the germination process?
2. Explain what growth inhibitors are and how they control seed and bud dormancy. Give several examples.

3a. Contrast cell elongation and cell differentiation.
 b. Contrast stems and roots.

4. Explain what auxins are. What are some of the effects of auxins and how do they work? What are some agricultural applications for the use of auxins?

Sample Test

1. Define, or explain and exemplify as fully as possible, 10 (ten) of the following:
   - mesophyll
   - glucose
   - epidermis
   - calcium
   - xerophyte
   - cuticle
   - transpiration
   - xylem
   - essential elements
   - symbiosis
   - absorption spectrum
   - palisade layer
   - micronutrient elements - enzymes
   - transpiration - cohesion - tension theory
2. What is the nitrogen-cycle? Why is it important? Why is nitrogen important?
3. Explain the stomata-guard cell relationship - what are they, how do they work, what function do they serve?
4. Explain photosynthesis and respiration. Be as specific as possible about photosynthesis - materials involved, the chemical reaction involved, what happens to the materials involved, where do they go? How does ATP become involved and how?

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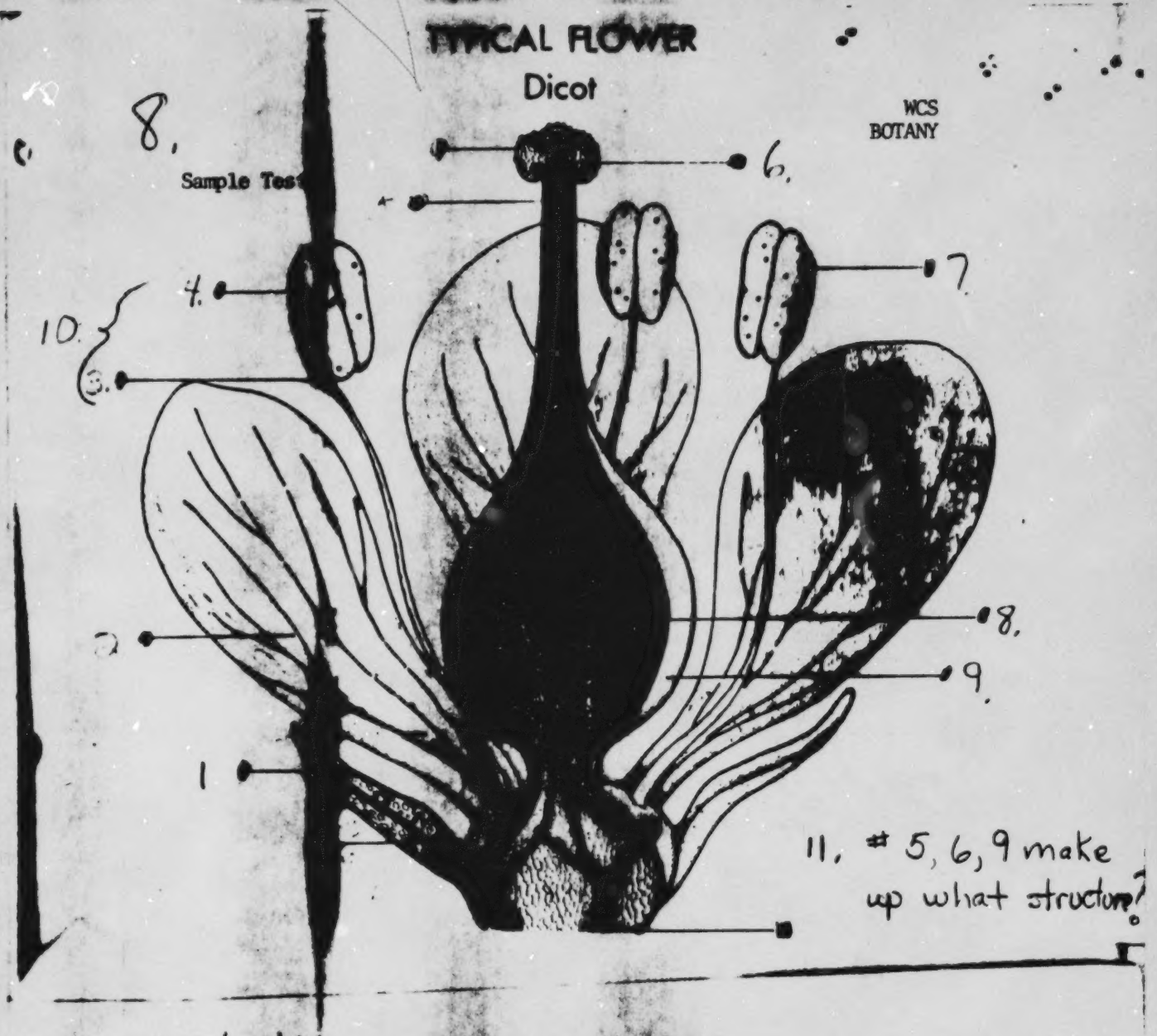

1. What do the results of this experiment tell you? Design two other experiments to confirm your findings or further your knowledge?

COCKLEBURS exposed to flower-inducing light cycle (*gray rectangles*) produced burs when only an eighth of a leaf remained on plant (*third from left*). Leafless plants and those exposed to other cycles did not flower.

ENTOMOLOGY

Entomology was described as an investigation, based on field and laboratory work, of the intriguing world of insects. Topics of discussion included anatomy, behavior, senses, flight, adaptations to the changing seasons, metamorphosis, evolution, relationships between insects and people, and the question of whether insects will become the next dominant organism on earth.

This course structure began with readings and memorization of insect identifications using habitat for the basis. For example, students would study aquatic insects, then consider how seasonal changes would effect this particular group of insects. Students studied the behavior of insects and spent time in observation. For the last three weeks of the courses, the class spent most of its time outside doing field projects. The class was tested throughout the course.

A Selected Bibliography

Primary Text:

Frost, S.W. Insect Life and Natural History. New York: Dover Books, 1959.

Secondary Texts and Reference:

Donald J. Borror and Richard E. White. A Field Guide to the Insects of America North of Mexico. Boston: Houghton Mifflin, 1970.

Chu, H.F. The Immature Insects. Dubuque, Iowa: William C. Brown Co., 1949.

Paul R. Ehrlich and Anne H. Ehrlich. The Butterflies. Dubuque, Iowa: William C. Brown Co., 1961. (Teacher's Note: good key).

Jaques, H.E. The Beetles. Dubuque, Iowa: William C. Brown Co., 1951.

Jaques, H.E. The Insects. Dubuque, Iowa: William C. Brown Co., 1947.

Klots, Alexander B. A Field Guide to the Butterflies of North America East of the Great Plains. Boston: Houghton Mifflin Co., 1951. (Teacher's Note: good pictures)

Sample Test

1. Define, explain, exemplify 10 (ten) of the following:
   - Orthoptera
   - order
   - parthenogenesis
   - Coleoptera
   - Diptera
   - elytra
   - Arthropoda
   - haustellate
   - Incesta
   - circi
   - Hymenoptera
   - polyembryony
2. The reproductive capacity of insects is dependent upon many factors. Discuss a) as many of these factors as you can and b) the reasons the Earth is not overrun by insects.
3. Discuss reasons why a) on the whole insects are small and b) yet so conspicuous.

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FALL TERM - Single Term Courses
HUMANITIES

AMERICAN LITERATURE

This course was a study of American writing from the mid-nineteenth to the early twentieth century. The class read works by Ellison, Fitzgerald, Faulkner, Porter, Kingston, and Thoreau, and investigated their historical and cultural origins.

This teacher felt that a course in American literature offered the possibility for students to study writers whose love of the land was very evident in their work. While the class was not taught to draw various environmental points from literary works, the teacher did take the time to discuss authors' points of view about and relationships to the land. Here are some excerpts from an interview in which she alluded to the kinds of attention she drew to various authors.

Excerpts from Teacher Interview

I think that of all the people we read, Faulkner had the most to say about the land. He really loved the land. I drew their attention to one place in Unvanquished where they're leaving their homeland during the Civil War, and they took some of the land with them. Each person did that, unbeknownst to the others, and each brought it to their new place. The grandmother, for

Excerpts from Teacher Interview, continued

instance, took cuttings to start again.

We noted Faulkner's keen sense of weather and change of seasons. Some of the students say that they are just becoming aware of things like the weather and all of its subtleties, that each day is new and different.

I drew attention to a beautiful passage at the end of Fitzgerald where he has a vision of Manhattan Island: its houses collapse before his eyes and he sees that beautiful island as it was when man first saw it.

A Selected Bibliography

Ellison, Ralph. Invisible Man. New York: Random House, 1972.

Faulkner, William. Unvanquished. New York: Vintage, 1934.

Fitzgerald, F. Scott. The Great Gatsby. New York: Charles Scribner's Sons, 1920.

Kingston, M.H. Woman Warrior. New York: Random House, 1977.

Porter, Katherine Anne. Pale Horse, Pale Rider. New York: Harcourt Brace Jovanovich, Inc., New American Library, 1970.

Thoreau, Henry D. Walden. New York: New American Library, 1973.

Sample Student Paper

We started through the forest of maples that had just put forth their aspiring yellow-green leaves. We climbed over stone walls strung with impotent barbed wire and ignored the posted signs. My mother justifies; the signs don't apply to us nature lovers (even though they do).

We are my mother, my friend, Donald and me. The setting is a foot hill of the Catskills, mountains of majesty, mystery, and picaresque lines; of Indian holiness scarred (or should I say scratched) by colonial and 19th century industry whose blue-stone lines the sidewalks of New York like scabs. The mountains that are made of the sediments of gentle giants one-half billion years old.

We enter the legendary goat lady's field. I never saw her or her goats. We continued up the terraced hillside over piles of rock slag and by quarries half filled with water seething with stagnant life. Donald and I play a game of "monopoly" (i.e. the person who first comes upon a natural or man made landscape feature, a rock slide, a quarry, a pond...claims it as his territory).

We traveled along a terrace with stunted maple trees. Ahead there was a "no trespassing" sign followed by an offensive "A" frame house and behind us we heard the obnoxious buzz of several trail bikes. We made cover running up the slope where some rocks jutted out at a perpendicular to the slope. We climbed on the uphill side of the rock and played Indians. The trail bikers passed below us, oblivious to everything around them except the amusement park rush of their machines. Once they were gone we shot our invisible flaming arrows and watched the invisible flames consume the house.

We climbed down the slope to where a stunted maple tree hung over the edge of a quarry. We rested and had lunch. We looked for mayflowers and found a batch near by. My mother cut a few flowers and leaves and put them in a plastic bag with some moss. (Mayflowers are illegal to pick and we all knew that but my mother explained that the reason they are illegal because most people try to pick the flowers by hand and since the plants are interconnected and delicate and they all come up when you try to take some but because we used scissors it was okay). We celebrated. Mayflowers are always a reason to celebrate.

Sample Student Paper, continued

We walked back toward the goat lady's field along the old quarry trails and came upon a lone boulder in the middle of the trail. Donald, being quicker on the climbs than I was, came into possesseion of the rock (heretofor refered to as big rock). Big rock was flat on top and had four cracks that marked the points of the compass. To me this rock was Board Walk and Park Place. So I relinquished all my other territories to Donald for Big Rock.

In later years my mother revealed to me how reluctant she was to see me make that trade because she thought I might throw a tantrum once I realized what I had done. And that it just the sort of thing a six-year-old like me might do but somehow the thought never crossed my mind.

EARLY MAN

This course traced the growth and development of human culture from its first signs (about 2 million years ago) through the Iron Age (about 1400 B.C.); recent archaeological findings have revealed a great deal about this so-called prehistoric period. Emphasis was on significant social and technical development such as toolmaking, hunting, primitive art, the birth of writing, agriculture, cities, and metal-working.

Excerpts from Teacher Interview

Well, the period of time I'm covering is from Neanderthal Man through the Iron Age. I chose to start there rather than earlier because anything earlier is in question. The focus is on the way in which people go about providing themselves with food, shelter and clothing. I guess they are getting, both directly and indirectly, an appreciation of the environment. As much as possible, I'm trying to get them to focus not on facts and figures, but on what it was really like to have to make your tools.

In studying the Bronze Age, you could see that metals changed society. It seems obvious that the average guy on the street did not benefit much at all from the discovery of metals.

Excerpts from Teacher Interview, continued

At that point you can see that the people reaping the benefits of the higher technology are members of a small elite society. The monuments reflect this: large ostentatious tombs for special people built through communal efforts. We've talked about how we are still wrestling with the same problems today. In spite of the great wonders of modern technology, great numbers of people are living at a subsistence level, inadequately sheltered. You really do, in this material, get to see how it is all interrelated. What it's all about underneath is providing food, clothing and shelter, and clearly we haven't solved those problems.

A Selected Bibliography

Constable, George. The Neanderthals. New York: Time-Life Books, 1973.

Hamblin, Dora. The First Cities, Emergence of Man Series. New York: Time-Life Books, 1973.

Knauth, Percy. The Metalsmiths, Emergence of Man Series. New York: Time-Life Books, 1974.

Leonard, Jonathan. The First Farmers, Emergence of Man Series. New York: Time-Life Books, 1973.

Prideaux, Tom. Cro-Magnon Man. New York: Time-Life Books, 1973.

Wernick, Robert. The Monument Builders. New York: Time-Life Books, 1973.

Sample Course Evaluation Questions

1. Please evaluate your own performance in this class. Be specific! Talk about the quality of your class participation. Did you keep up with the reading assignments? If not, why not? Did you do the written assignments? How well?

2. Briefly describe what you consider to be your strengths and weaknesses in relation to the work we have been doing. How might you improve your performance? Be specific. Be honest!

3. Evaluate overall class situation and my role as teacher/facilitator. Again be honest!! Did this class turn out to be what you expected it would be? Better? Worse? If not, what did you expect?

4. What kinds of changes would you suggest to improve the course? A different approach? A different emphasis? Different subject matter? A different teacher!!!! etc.

5. Finally, please try to describe what you think you have gotten out of this course. Has this been a valuable experience for you? Has your understanding of early man changed in any substantial way? How? Can you relate what we have studied about early man in a relevant way to the realities of life in the present?

Sample Student Response to Course Evaluation Questions

1. My class participation was good compared to the rest of the class. I was not and I am not obsessed with phallic symbols or being obnoxious (thus disturbing the train of thought). I thought I asked good informative questions which helped lead to important points of the reading.. I kept up with the reading doing about 75% and skimming

Sample Student Response, continued

the remaining (boring) 25%. I did the first written assignment (and I could've been a little more specific). I think my performance on this was satisfactory. I did not do the outline on the Cro-Magnon man so I failed this written assignment.

2. My strengths are I catch on quickly when things are well defined. When things aren't well defined, and I don't understand them, I get all caught up in them and lose it even more. Reading assignments more than once would probably help this the most.

3. I expected the general level of maturity to be a lot higher then it was. Along with (two students) setting off (four students), what happened was you were forced into playing a disciplinarian not a teacher. So then this took away from your teaching, my learning, and the general concentration of the class on whatever specific subject we were discussing. I think it was worse than I expected because of this, but perhaps my expectations were wrong not the way these people acted.

4. I think the most important change in the course would be the availability of more facts and less assumptions. Early Culture, I think will solve this problem. I think that if we did something like write a summary of the important ideas from the night before's reading assignment, and write a few questions if you don't understand it. This would make it so that there would be a little direction to a lost class. I think you're a good teacher, and that it was fucked up that you and I had to try to deal with the obnoxiousness.

5. I have more of an understanding of Neanderthal and Cro-Magnon and man getting started. I know a lot (compared to what I did know) about tool making. Early Man was not as ignorant (dumb) as I thought. I've learned a lot about living simply and surviving with really nothing to go on. It was a really good course some times and I enjoyed taking and learning about these people.

Have a merry Christmas!

THE 1920'S

This was designed as an introduction to life and thought during the first "modern period". In their examination of the effects of a rapidly changing social order upon individuals, students investigated tentative answers to these questions: has industrialism created a "mass society"? Why were intellectuals and artists "alienated" from American society? What political and economic events caused the Great Depression?

Excerpts from Teacher Interview

One of the questions that concerns me is whether the students can relate the world at large to their own reality. What I did in the 1920's course was to use different texts. One was a recent history book; another was a modern American history text. In addition, each student had to conduct a personal interview with someone who would have a first-hand recollection of the 1920's, and then write a term paper. I don't subscribe to the trend that oral history is out to replace scholarly history. Oral histories lack reflection, lack discipline. I do think that when they're available, they illuminate and expand. That part of the course was very successful for those who did it.

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Excerpts from Teacher Interview, continued

Some came up with stories from the interview that were in direct conflict with the texts; other stories agreed with and reinforced the texts.

This teacher began with more complex expectations than it was possible to carry out. Ultimately, through a process of reconsideration, he arrived at what he felt were the crucial ideas.

Finally, I got to a certain body of information. They should have a general knowledge of the policies of various administrations; they should know what prohibition was and the social effects of prohibition; they should know the theory of post-World War I disillusionment. These are not very subtle concepts - they're rather limited in scope - but some are just not equal yet to grasp the subtleties that I wanted to get across, and I don't want to leave them by the wayside.

One of this teacher's underlying concerns was that students become aware of the characteristics of systems and to be able to teach students to distinguish between all of a problem and part of a problem. He uses the example of Coolidge's presidential administration to illustrate his view.

To critically examine a presidential administration, you've

Excerpts from Teacher Interview, continued

really got to examine two separate questions: how well did they accomplish what they set out to do, and how worthy was what they set up? Did they or did they not accomplish their goals? You have to examine their effectiveness in reaching their goals. This became particularly important when we examined Calvin Coolidge who is regarded by most (except the very contemporary historians) as a poor president. He was more or less a passive president; he had a poor leadership of Congress. Now this analysis of Coolidge presupposes a philosophy of the presidency. The historians that have taken this view of Coolidge were enthralled with Roosevelt, who is held, one way or the other, to have saved the country by concentrating a great deal of power - which he apparently used very well. What I had the kids do, was to consider what it means not to accept this: what if we don't accept that a strong presidency is good for the country? What if, instead of Roosevelt, there's Richard Nixon? All of a sudden this idea of a strong presidency is not such a good idea.

As a matter of fact, it was not laziness, or a lack of interest, that caused Coolidge's passivity. In fact, he was adhering to a very well thought-out, organized philosophy that

Excerpts from Teacher Interview, continued

a strong presidency was not good; an active president was bad for the country. It's not just how well you do what you do, but whether you should be doing it in the first place. You have to examine worthiness along with effectiveness. Look at Hitler. He was a good leader until 1944 - he always did what he set out to do effectively.

A Selected Bibliography

Allen, Frederick L. Only Yesterday. New York: Harper & Row, 1957.

Henry F. Bedford and Trevor Colburn. The Americans: A Brief History Since 1865. New York: Harcourt Brace Jovanovich, Inc., 1976.

In addition:

Each student did a term paper relating to the 1920's. These were chosen individually and involved a potpourri of materials.

Sample Student Paper/The Affects of the Automobile in the 1920's

The automobile has had a diverse affect on American society and its environment starting in the 1920's. Henry Ford published his autobiography in 1922, and he wrote not only of changes taking place, but specifically the ones caused by the automobile.

> "When one speaks of increasing power, machinery, and industry there comes up the picture of a cold, metallic sort of world in which great factories will drive away the trees, the flowers, the birds, and the green fields. And that then we shall have a world composed of metal machines and human machines. With all of this I do not agree. I think that unless we better understand the mechanical portion of life, we cannot have the time to enjoy the trees, and the birds, and the flowers, and the green fields."[1]

Looking at the tremendous increase in use and ownership of the automobile sheds light on why the affects, the changes in life styles and thought were so numerous in the 1920's (see tables).

The automobile affected families, friends, and people everywhere. Never before had there been a mode of transportation that was so individual and capable of going in almost all directions. People could go from here to there faster. It opened up new human resources; one could develop relations with not just the people next door but with people anywhere in town or even in the county. But the automobile also had bad affects on community homogeneity or togetherness, because one wasn't forced to stay at home or within a certian community.

Motor vehicles had a tremendous effect on the people of the times, and the economy, the automobile also started a change in the environment. In both the cities and the country, roads had to be redesigned and or built to make way for the coming of the automobile. Because of the automobile in the 1920's, the environment went through a changing process that we feel more than ever today. Urban sprawl, destroying of wilderness and farmlands started because of the automobile, and its need for roads.

Before the 1920's the automobile existed and was being mass produced, and even raced. Still, the automobile was in a pioneering stage. The Ford Motor Company introduced mass production and the assembly line in 1903. The motor car driver of the pre-1920's had to be courageous, be mechanically inclined, and carry a large tool kit in his or her vehicle. Early roads were not designed specifically for autos and most roads in snow country were not plowed until well into the '20's.

"Congress contributed its first substantial road-

Student Paper, continued

> building subsidy with the passage of the Rural Post Roads Act of 1916, which granted the states $75,000,000 over three years, after 1920 $75,000,000 was provided every year until the depression."[2]

With the 1920's came better roads and increased traffic density.

The pre-1920's was a time of improvements for motor vehicles. Ford introduced the truck and farm tractor around 1910. Ford produced a universal chassis and separate carriage builders or other businesses put on special wood bodies to fit the consumer's need. The prices of some automobiles actually went down because of improvements in production techniques, from the early years and into the 20's (see table of prices).

In 1900 there were 8,000 motor vehicles, in 1910 there were 468,000 and by the beginning of the roaring twenties there were 9,239,161 motor vehicles. The automobile was America's most booming business! By 1930 there were 26,531,999 motor vehicles in the United States.

In the 1920's the car had become a normal part of society and most American families. One didn't need to be a mechanical whiz to get around in a car, anymore. Special motoring clothes were a dying fad. The model T became cheaper than ever before and hit its lowest price ever in 1923 ($290, see table about model T prices).

These following quotes help to show why the automobile alone changed society in the 1920's so much.

> "The mass-production techniques of Ford; the development of sheet steel auto frames; and installment buying financed by the automobile companies all played a role in the incredible saturation of the automobile into the American society. The tempo of American life speeded up proportionately.."[3]
>
> "Its coming changed America from a slow-paced, predominantly rural country to a swift moving, highly industrialized and highly urbanized."[4]

The automobile provided a new kind of mobility that was fast, cheap, and in all directions. The car changed people's lives everywhere. The lonely desolation of rural inhabitants and farmers decreased. The city dweller could escape to the country, and start interming with his country brothers and sisters more easily than ever before. The distinction between city and country, and city dweller, and country dweller, began to fade. Even though it was still a rough experience, with the growth of good roads and service stations, traveling long distances in the automobile was a new trend. Most of the American society was going mobile in the roaring '20's.

Student Paper, continued

TABLE OF PRICES OF THE MODEL "T"

	COST
First year of production: 1908	$850.00
Dates in between N/A book went back to library (inter loan)	
By 1922-3 because of competition	$290.00

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TABLE 6

U.S. PRODUCTION SINCE 1900

	Passenger Cars		Motor Trucks and Buses		Total	
	Number	Value (000)	Number	Value (000)	Number	Value (000)
	4,192	$ 4,809	. . .	. . .	4,192	$ 4,809
	[illegible]	[illegible]	750	[illegible]	25,000	40,000
	[illegible]	[illegible]	5,000	[illegible]	187,000	225,000
	[illegible]910	[illegible]	20,000	[illegible]	209,930	701,778
	[illegible]560	[illegible]	321,789	[illegible]	1,817,349	2,232,420
	[illegible]171	[illegible]	350,649	[illegible]	2,265,830	2,916,770
	[illegible]456	[illegible]	325,364	[illegible]	1,582,820	2,034,835
	[illegible]774	[illegible]	697,367	[illegible]	3,971,241	3,088,814
	[illegible]665	[illegible]	754,901	987,820	4,472,286	2,938,474
	[illegible]332	[illegible]	655,681	1,181,968	725,215	1,239,210
	[illegible]663	[illegible]	4,337,193	1,707,748	8,003,056	10,175,885
	[illegible]186	[illegible]	8,249,106	[illegible]	9,169,292	14,423,844
	[illegible]706	[illegible]	4,194,475	[illegible]	7,899,271	14,514,914
	4,837,728	[illegible]	5,982,708	[illegible]	9,100,436	17,503,261

[illegible] commercial proportion of the trucks and buses consists of chassis only; therefore the value of the [illegible] is not included. [illegible] based on vehicles with standard equipment. Federal excise taxes [illegible]

[illegible] Automobile Manufacturers Association.

TABLE 7

[illegible] REGISTRATIONS SINCE 1900

[illegible] as of	Passenger Cars	Buses	Trucks		Total
			Number	Percent of Total	
		—	—	—	8,000
		—	70,133	2.2	468,500
	8,[illegible]	—	1,107,839	12.0	9,239,161
	22,[illegible]	[illegible]507	3,518,707	13.3	26,511,999
	27,[illegible]	32,841	4,590,386	14.3	32,035,424
	40,[illegible]	323,652	8,609,448	17.5	49,161,691
	61,[illegible]	372,129	11,937,589	16.2	73,768,566
	68,[illegible]		13,606,000		82,058,000

[illegible] registrations shown here [illegible] with vehicles in use since the latter implies a count of [illegible] on a specific [illegible] for a period of time, while registrations are a count of trans- [illegible] eliminated [illegible] period. Buses are not segregated from passenger cars or [illegible] years. Also include [illegible] owned buses engaged in public transit. Due to new method [illegible] in 1950, the bus [illegible] years are not strictly comparable. The addition of Alaska and [illegible] registration counts [illegible] for increases in the U.S. totals. Data for the years 1950 to [illegible] revised to exclude [illegible] registered at a nominal fee in certain states and restricted to use [illegible] of the owners' farms. [illegible] 1950 and following years exclude military vehicles.

Source: U.S. Bureau of Public Roads.

[illegible] way that, however, [illegible] automobile by itself that exerted these [illegible] social and [illegible] influences, but the automobile linked with mass production.

The growth of the [illegible] automobile industry is therefore

This table comes from a page in The American Automobile by John B. Rae. [illegible] (Pub)

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Student Paper, continued

The automobile affected families in the 1920's. The automobile gave families freedoms they had never known. One didn't have to stay at home. One could buzz into town and see one of those "talkies", or just go touring. The automobile provided a new form of relaxation, recreation, and means to vacations. Families could enjoy weekend vacations to the ocean or the mountains because the automobile made it economically and physically possible. Some historians feel that the car separated the family. Father or some member of the family could take off in the car. The new recreations provided by the car also brought families together. It loosenes the morals within families. Young men could take the car and seduce their girls right in the family car. All and all American families were quite charmed with their new status symbols and most were very willing to take on the financial burden to pay for their automobiles.

My grandfather, who was going to college during the 20's, saw the effects that the automobiles started in the 20's on community homogeneity. He used to travel up to a small dairy farm in Northern Vermont, to see a girl. He remembers the strong community spirit. People relied on each other for entertainment and friendship. People in the community couldn't hop in their cars and drive 10 miles to Montpelier, (the state's capital) in the winter because the roads weren't plowed. Traveling in the winter was done by horse drawn sleds and a lot of foresight was used before heading out. The community he visited was a real community in the true sense of the word. One knew who his neighbor was and what he was up to. My grandfather saw the coming of plowed roads and automobiles change this community homogeneity. With the automobile people could come and go as they pleased. Community members didn't have to rely on each other for friendship and entertainment. They could hop in their cars and go downtown. The breakdown of community homogeneity started in the late 20's and the results can be plainly seen in today's society.

People learned about the wonderful mobility provided by the automobile in the 1920's, but they also learned about the hardships caused by the automobile. Highway fatalities increased to concerning numbers in the 20's, but most everybody wanted to be mobile. People also learned about the breakdowns, flats and all the things that make cars stall beside the road. They knew all about the incredible traffic jams that make today's traffic jams look like minor delays.

The reason the automobile had such a profound effect on the economy of the 1920's was the demand for it. Almost all of the American society wanted a horseless carriage. The automobile industry extended credit to the buyers so that a buyer only had

Student Paper, continued

to come up with 10% of the cash of the retail price and then make payments. The demand was especially high in the 20's because manufacturers had learned to make reliable, cheap cars. The Ford Motor Company learned to mass produce with the assembly line so that the factory produced high quality, high quantity at a reasonable price. Because of the demand, about 40,000,000 give or take a few million, cars were produced and sold, between 1920 and 1930.

The number of cars produced in the 1920's provided numerous jobs and boosted the economy tremendously. The great highways, bridges, hard surfaced roads, hotels, gas stations, and all the businesses that go along highways had to be built. Repair stations, gas filling and auomotive supply houses sprung up everywhere to aid the motorists, creating more jobs. Now think of the automotive industry itself, and the millions and millions of jobs it produced, not to mention the steel industry, tire companies and all the other commodities needed to built millions of cars per year. The automobile was responsible for boosting the economy and creating many, many jobs, in the 1920's.

Besides the automobile industry, all the related jobs it created, motor vehicles changed all of the commercial world. Trucks provided a new fast, multidirection cheap transportation for all commodities. My grandfather mentioned to me that motor vehicles, trucks, snowmobiles (autos or trucks with skiis up front and belts and chains instead of tires) and tractors completely changed the logging industry. Farming was totally up dated with the tractor and truck. The truck and automobile allowed business to move away from the centers of town, and railroad tracks, to outskirts along main highways, starting the present environmental sickness URBAN SPRAWL!!! Motor vehicles "started the decline of the rail roads and started us upon the journey toward the present energy crisis to say nothing of the environment."[5]

The 1920's, motor vehicles changed America's life styles, economy, business, and last but not least important America's rural environment. The automobile needed good roads to drive on, and drivers needed roads going everywhere. In the early 1900's there were only 200 hard surfaced roads in rural and suburban America. By 1915 there were 276,000 hard surfaced roads and then by 1925, there were 521,000 hard surfaced roads.[6] As I mentioned earlier the federal government got in the road building business in 1916 with the Rural Post Road Act. Farm country and wilderness turned into highways and garages, stores, billboards, and all the other garbage that goes along with the great highways. The worst impact the automobile had on the environment was the starting of urban sprawl. The automobile allowed people to flow in nearly

Student Paper, continued

any direction, especially in and out of cities. Consequently suburbs were forming all around cities not just by train stations, starting in the 1920's. People could live almost anywhere within driving distance of their work. The spreading out of business and industry along highways from business districts changed the environment greatly. Urban sprawl didn't totally harm the environment of the 20's, but it started the sprawling of the cities so plainly seen in the eastern seaboard cities today. The changes made by in the environment by the automobile are permanent and never will America be the same as it was before the 1920's, before the 1900's and the coming of paved roads.

The automobile had a drastic impact on America. Technology does not always seem so nice at times. The mechanical age has its roots in the 1900's and the 1920's. I see the development and use of the automobile, in the 20's as a sad event in a way because of its bad effects.

Still, I love motorized vehicles. The feeling of covering 650 miles in a day on two wheels is not something I forget quickly. Oh, yes there were motor cycles right along with cars in the 20's. My grandfather almost bought one.

Some of us will see the decline and some the death of the car as we know it. Something new, now unthinkable, as the horseless carriage first was to the people of the 1900's, will come. It will provide outrageous kinds of transportation. I want to see it and probably will in my lifetime!!!

"Yea, wee, he...I going mobile, mobile, mobile...I don't care about pollution watch the policeman and the tax collector miss me. I'm mobile!!! I don't care about air pollution. I'm a air conditioned gypsie...And when I'm driving in my car the world's my home....."[7]

1. Henry Ford, Ford, Detroit, City Publishers, 1922, page 1
2. J.M. Petulla, American Environmental History, Boyd and Fraser Publishers, 1977, page 238.
3. American Environmental History, page 241
4. Philip V.D. Stern, Pictorial History of the Automobile, Viking Press, 1953, page 17.
5. From Carl Tracy's Interview "Talking History" with G.R. Belchur, 1978.
6. American Environmental History, page 231.
7. A song by The Who goes something like that, "mobile". It is off the album "Who's Next".

ring about the successful runs made
ly publicized contest, American in-
earnest. It was estimated by a con-
ome two thousand American men
g about building—experimental cars

new cars began to appear. On March
9-) became the first person to
bile through the streets of Detroit;
1863-1947) finished the car shown
per, Ransom E. Olds (1864-1950)
car and drove it in Lansing, Mich.;
nder Winton (1860-1932) finished
ted motor carriage and operated it
these the only ones. The *Times-*
had given the automobile so much
of manufacturing companies were

nd. British-built Daimlers were be-
tured, and several projected all-
panies were planning to start opera-
glish people could hope to take up
had to get rid of their restrictive
made it practically impossible to
British public roads. After much
re finally repealed in 1896. Novem-
the restrictive acts went out of ex-
ty Day by Englishmen who wanted
lebration was held, and a "proces-
ighton was staged to commemorate
ree motor cars, practically all im-
Germany, took part in the run to
can Duryea cars were present, and,
re practically making a race of it."
utomobile was limited, a trainload
ee the fun. It was a great occasion,
nagazine, *The Autocar*, celebrated
e in red ink.

arked by several other memorable
obile track race in America was
. R. I. It was won by a Riker Elec-
ge speed of 26.8 mph. And it was
Barnum and Bailey Circus used a
rades.

no good reason to believe that the
an internal-combustion engine was
opular that it would drive all other
opulsion from the road. Steam,
ed for railroad locomotives, ships,
mobile threshing machines, still
eful and flexible source of power.
e people still believe that the auto-
urse in its development and would
t amount of engineering skill lav-
[illegible] engine had been [illegible]

AMERICAN AUTOMOBILE MANUFACTURERS WHO WERE IN BUSINESS BEFORE 1900

This list does not pretend to be complete, but it does include all the better-known companies. Individuals like Henry Ford and Charles B. King are not listed. They built hand-made experimental models before 1900 but they were not producing cars commercially. Of all these companies, only three continue to manufacture automobiles: Autocar (trucks), Oldsmobile, and Packard (Ohio).

American Electric Vehicle Company (Waverly), Chicago
Autocar Company of America, Ardmore, Pa.
Automobile Company of America, Marion, N. J.
Baker Motor Vehicle Company, Cleveland
Buckeye Manufacturing Company, Anderson, Ind.
Chicago Motor Vehicle Company, Chicago
Columbia Automobile Company, Hartford
De La Vergne Refrigerator Manufacturing Company, New York
Duryea Manufacturing Company, Peoria, Ill.
Duryea Motor Wagon Company, Springfield, Mass.
Electric Car and Wagon Company, Philadelphia
Electric Vehicle Company (Columbia), Hartford
Grout Brothers, Orange, Mass.
Hasbrouck Motor Company, New York
Haynes-Apperson Company, Kokomo, Ind.
Hill and Cummins, Chicago
Holyoke Motor Works, Holyoke, Mass.
Horseless Carriage Company (Salisbury), Chicago
Kensington Automobile Company, Buffalo
Lane Motor Vehicle Company, Poughkeepsie, N. Y.
Leach Motor Vehicle Company, Everett, Mass.
Locomobile Company of America, Bridgeport, Conn.
Mobile Company of America, Tarrytown, N. Y.
Morris and Salom, Philadelphia
Mueller, H. and Sons, Decatur, Ill.
Oakman Motor Vehicle Company (Hertel), Greenfield, Mass.
Ohio Automobile Company (Packard), Warren, Ohio
Olds Motor Vehicle Company, Lansing, Mich.
Pittsburgh Motor Vehicle Company, Pittsburgh
Pope Manufacturing Company, Hartford
Racine Motor Vehicle Company, Racine, Wis.
Riker Electric Motor Company, Brooklyn, N. Y. and Elizabeth, N. J.
St. Louis Motor Car Company, St. Louis
Stanley Brothers, Newton, Mass.
Stearns, F. B. and Company, Cleveland
Sturgess Electric Motocycle Company, Chicago, Ill.
Thomas Kane and Company (Pennington), Racine, Wis.
United States Automobile Company, Attleboro, Mass.
United States Motor Vehicle Company, New York
Whitney Motor Wagon Company, Boston

Student Paper, continued

Bibliography

Ford: The Times, the Man, the Company, by Allan Nevins published by Scribners c. 1954 (I didn't use this book much)

My Life and Work, by Henry Ford Published by Doubleday, Page & Co. c. 1922 (I found this book very insightful to the man, Ford).

Pictorial History of the Automobile by Philip V.D. Stern The Viking Press c. 1953 (A helpful, interesting book)

American Environmental History by Joseph M. Petulla c. 1977 Boyd and Fraser Publishing Co. (Probably the most useful book I found)

An Illustrated History of Ford produced by Ford Motor Company c. (A good book, for the history at Ford, sorry I don't have more infro on book I lent it)

The American Automobile by John B. Rae c. 1965 The University of Chicago (The second most useful book lent to me by Fred B.)

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THE SOCIAL SELF

This course was intended as a study of the definitions of the self through the ages, from the ancient Greeks to the early Christians, from the philosophical viewpoint of Descartes to the empirical/scientific observations of modern social psychologists. The course was seen, in planning, as having the potential of extending students' awareness of others and the environment through an examination of the idea of self.

In practice, the course evoked strong emotional and personal responses to the issues raised. The personalization of issues made it difficult to maintain the perspective necessary to focus on the research questions and the discussion of observation and methods as used by social scientists.

Areas that were discussed included the idea of self in terms of the individual and how s/he relates to his/her community; one to one relationships; peer relationships and adult/adolescent relationships; individual personality; academic achievement; child rearing practices and how those affect personality.

Excerpts from Teacher Interview

The first paper was a research paper; the idea was to

Excerpts from Teacher Interview, continued

understand how different methods were used - how to collect data and interpret data, just to give them an idea of what tools and methodology are available to the social scientists in terms of research. The environmental issues that I was going to get to went so far as, let's say, being aware of how really dirty the dorm is, and how they can't do anything about it; talking about kicking a hole in the wall and why that is done. I mean, this is something that is done to your environment.

A Selected Bibliography

Primary Texts:

CRM Books Editorial Staff. Understanding Psychology. Des Plaines, Illinois: Bantam Books, Inc., 1974.

Miriam S. Grace, Philip T. Nicholson, and Don R. Lipsit. Your Self. New York: Hart Publishing Co., Inc., 1976.

Hamachek, Don E. Encounters With the Self. New York: Holt, Rinehart & Winston, Inc., 1971.

In addition:

Excerpts from numerous books on social psychology, child psychology, and behavioral psychology by Erikson, Maslow, Carl Rogers, Adler, Horney, George Mead, and others.

Articles from Human Behavior and from various news magazines - specifically, articles pertaining to Synanon and Jonestown.

Books Used for Student Reports, Selected List:

Laing, R.D. Knots. New York: Random House, 1972.

Monsky, Mark. Looking Out For #1. New York: Simon & Schuster, 1975.

Prather, Hugh. Notes to Myself. Moab, Utah: Real People Press, 1970.

Sample Student Paper

There's a large gaping hole in the wall of O.M.H. Beside the wall lay a particular hat - a hat that is well known to everyone.

I wonder what the reaction would be - would people believe the hole was made by the person who belongs to the hat (or rather who the hat belongs to)? or would people actually (really) be all that responsive?

To most, except those who live in the dorm; it would probably be just another hole among others. Yet those in the dorm would very likely have a stranger reaction. For it's a gross alienation among the home of these people. They would have to live with this, look at it from day to day. Until probably, (since people seem to need scape goats), would start acknowledging that hat. "Is it evidence? Did the person drop the hat while kicking in the wall.....?" Things such as these would be going through the minds of these people; they would want someone to blame. And would "look" for it. (Thus "making" the person fix this hole.) This is mainly brought through by personal experience, yet still I'm not sure.

I think that I would also look for someone to blame after awhile - because later, in a few weeks, that hole would get longer, people would lose respect for the dorm; more holes would accummulate; and finally more irritations would arise; thus causing more holes and more, then,.....fury.

Sample Student Paper

The common room is just mellow and people are mostly off in their own trips. Person A comes jumping into the common room with a huge smile, twirling around like a dancer and letting off happy, contented vibes. Slowly everyone begins to talk and the whole room is like a rising sun. The people are enjoying themselves intensly. They are all very smiley and no longer feel separate in their feelings and interests. The phone rings and a person jumps up enthusiastically to answer it. The phone is for our dear smiling dancer who runs up to converse with her mother. The common room begins to mellow out and once again is neutral in conversation.

Sample Student Paper, continued

Person B comes stumbling into the common room moaning and complaining about various problems and giving everyone looks of despair and untogetherness in general. Once again there is a turnover in the vibes. Another person also starts agreeing with the down person on the shitty things and then most everyone starts complaining and ugghhh.....We all drift off into thoughts of dismay.

Then person C comes in with a Whole Box of chocolate chip cookies which he is gladly willing to share with everyone of the sorrowful beings in the room. Everyone starts pigging out and sharing the experience of munching on delicious home-made cookies! But of course after a chocolate chip cookie you have to have a glass of cold delicious milk to help wash down the wonderful taste. Everyone goes running into the blue common room all eager to gulp down some milk. We all run to the refrigerator and tragedy: only 1 milk left. Well this starts a whole new trip. Everyone thinks they need it the most. Greed begins to appear in our piers eyes and one of our fellow dormies grabs the milk and goes tearing out of the room.

We all chase him but can't seem to catch up to him so we moan and groan about how greedy he is and how often he shows this kind of behavior. The whole night was kind of an on-off sort of evening. But it just goes to show how just a little bit of stimuli gets everyone going.

UTOPIAS AND ALTERNATIVE FUTURES

This course was an examination of the vision of the good society: its attributes and its desirability, as well as alternative suggestions as to how it might be brought into existence and what forms it might take. Various authors' views of the nature of man, and perceptions of reality, were also investigated. Three different visions from the world of fiction were offered first in Skinner's Walden Two, Huxley's Island, and Piercy's Woman on the Edge of Time. Then selected chapters from Hazel Henderson's Creating Alternative Futures, Buckminster Fuller's Utopia or Oblivion, and Stavrianos' The Promise of the Coming Dark Age were read to suggest several possibilities for the realization of the good life in the near and distant future.

Background

This course had been taught for the last eight years at the school and in the process of the interview something of its evolution emerged. The course began as a colloquium which took place evenings in the teacher's home. He began with readings from utopian anthologies and Thomas More's Utopia. For the next

Background, continued

few years the focus became a survey of what various people in various historical periods have felt to be the ideal society. Then it changed to considerations of a society in which one could lead the good life - not life in the perfect society. Increasingly there was a distinction between the Greek ideas of Outopia and Eutopia. Most recently, part of the course has allowed for research on some utopian experiment from the past or in the present. The questions have become: how did it function? What were the ideas behind it? And if it was in the past, how did it fail? What were its successes?

Research papers emerged as an important part of the course from both the student's and teacher's perspectives. At one point when they were omitted, students were disappointed and indicated the importance of doing something on their own. Other evaluation requirements have included journals, series of short papers, oral reports.

Books Used Over the Years

Utopia - Thomas More
Republic - Plato
Brave New World & Island - Huxley
Looking Backward & What I Saw - W.W. Satterlee
The Dispossessed - Ursula LeGuin
Walden Two - B.F. Skinner
Gulliver's Travels - Swift
WE - Zamatia
Ecotopia - Callenbach
Woman on the Edge of Time - Marge Piercy

Excerpts from Teacher Interview

I asked them to research existing communities. I accumulated a list of communities that are utopian experiments that are still going or have failed in the last decade. They are asked to examine them. What is the structure, how does it operate? I've given the categories that a historian uses to look at a society: economic, social, political, intellectual. I've also asked them for short papers on each of the three books that we've read, addressing what I take to be the central problem: for example, with Skinner the question of freedom - with Huxley the whole question of transcendence.

Now we're reading Hazel Henderson. We're reading what she is saying about the over-inflation of corporate power, and what that has meant to the U.S., and what highly industrialized technology has meant, and the kinds of conflicts it has presented, what is being done. The exciting thing about Hazel is that she feels that the thing we have to do in the next few years is to identify each other and see what we are doing. She doesn't encourage us to marshall our forces as a political entity until we get to know each other.

A Selected Bibliography

Fuller, R. Buckminster. Utopia or Oblivion: The Prospects for Humanity. New York: Bantam Books, 1969.

Henderson, Hazel. Creating Alternative Futures. Princeton, N.J.: Princeton Center for Alternative Futures, 1978.

Huxley, Aldous. Island. New York: Harper & Row, 1962.

Piercy, Marge. Woman on the Edge of Time. New York: Knopf, 1976.

Skinner, B.F. Walden Two. New York: Macmillan Publishing Co., 1969.

Stavrianos, L.S. The Promise of the Coming Dark Age. San Francisco: W.H. Freeman, 1976.

Reading Assignments

Date Due		To Be Read and Discussed
October	3/4	Xeroxed pages from Lewis Mumford and Marie Berneri
	5	Skinner, pp. 5-66 (Chapters 1-8)
	6	Skinner, pp. 67-115 (Chapters 9-14)
	9/10	Skinner, pp. 116-157 (Chapters 15-19)
	10/11	Skinner, pp. 158-210 (Chapters 20-24)
	12	Skinner, pp. 211-279 (Chapters 25-30)
	13	Skinner, pp. 280-320 (Chapters 31-36)
	16/17	PAPER (2-3 pages) on the nature of freedom
	17/18	Huxley, pp. 1-61 (Chapters 1-5)
	19	Huxley, pp. 62-107 (Chapters 6 & 7)
	20	Huxley, pp. 108-160 (Chapters 8 & 9)
	23/24	Huxley, pp. 161-201 (Chapters 10-12)
	24/25	Huxley, pp. 202-235 (Chapter 13)
	26	Huxley, pp. 236-295 (Chapters 14 & 15)
	27	PAPER (2-3 pages) on the importance of transcendence MID-TERM SELF-EVALUATION DUE
	30/31	Piercy, pp. 1-58 (Chapters 1 & 2)
	30/1	Piercy, pp. 59-106 (Chapters 3-5)
November	2	Piercy, pp. 107-163 (Chapters 6-8)
	3	Piercy, pp. 164-215 (Chapters 11-13)
	6/7	Piercy, pp. 216-271 (Chapters 11-13)
	7/8	Piercy, pp. 272-325 (Chapters 14-16)
	9/10	LONG WEEKEND
	13/14	Piercy, pp. 326-381 (Chapters 17-20)
	14/15	PAPER (2-3 pages) on the issue of sexism
	16	Fuller, pp. ix-x, 1-11, 114-133 (Intro, Chs. 1 & 4)
	17	Fuller, pp. 207-242 (Chapter 8)
	20/21	Fuller, pp. 242-281 (Chapters 8 & 9)
	21/22	Fuller, pp. 281-292, 343-363 (Chapters 9 & 12)
	23	Henderson, pp. ix-x, 1-26, 225-235 (Foreword, Chapters 1, 2, 13)
	24	Henderson, pp. 237-267 (Chapter 14)

Reading Assignments, continued

	27/28	Henderson, pp. 269-302 (Chapters 15-17)
	28/29	Henderson, pp. 303-338 (Chapters 18 & 19)
	30	Henderson, pp. 339-370 (Chapters 20 & 21)
December	1	Henderson, pp. 371-403 (Chapters 22 & 23 & Epilog)
	4/5	Stavrianos, pp. vii-x, 1-24 (Preface & Chs. 1 & 2)
	5/6	Stavrianos, pp. 25-55 (Chapter 3)
	7	Stavrianos, pp. 56-82 (Chapter 4)
	8	Stavrianos, pp. 83-135 (Chapter 5)
		REPORTS AND PAPERS DUE
	11/12	Stavrianos, pp. 136-163 (Chapter 6)
	12/13	Stavrianos, pp. 164-196 (Chapter 7)
	14/15	PERSONAL UTOPIAN VISION (3-5 pages)
		COURSE AND SELF-EVALUATIONS DUE

Reports on Alternative Communities

Oral presentation and formal research paper with full documentation due on the date given below. The text of the paper should be between 8 and 10 pages in length. Give your #1, #2, and #3 choice of topics.

Topics	Date Due
Twin Oaks Community - Virginia	Nov. 27/28
New Harmony, Indiana - 19th century	Nov. 28/29
Brook Farm - West Roxbury, Mass. - 19th cent.	Nov. 28/29
The Oneida Community - near Utica, NY - 19th	Nov. 30
Port Royal, South Carolina - 19th century	Nov. 30
The Bruderhof - NY, Penn., Conn.	Dec. 1
The Kibbutz - Israel	Dec. 1
Total Loss Farm - Vermont	Dec. 4/5
The Farm - Summerhill, Tennessee	Dec. 4/5
New Alchemy - Falmouth, Massachusetts	Dec. 5/6

Reports on Alternative Communities, continued

The Cerro Gordo Community - Cottage Grove, Oregon	Dec. 5/6
Findhorn - Scotland	Dec. 7
Lindisfarne - Long Island	Dec. 7
Arcosanti - Arizona?	Dec. 8
Capricorn - 2003 - Utopian humanist model	Dec. 8

WINTER TERM - Single Term Courses
WHOLE LIFE SKILLS

SELF-SUFFICIENCY

The class explored the areas in which it is possible for the Woodstock Country School to become more self-sufficient: food, shelter, and energy. The class looked at the community as it exists and attempted to design the preferred state. Research was in design science and systems thinking as well as food production, architecture, and practical energy problems.

The plan for this course came about following discussions initiated by the school's headmaster around self-sufficiency as an important direction for the school to pursue.

Excerpts from Teacher Interview

I had intended to teach a course involving concepts of appropriate technology. The idea of self-sufficiency was being discussed as a direction for the school - people were excited - and we discussed the feasibility of involving students by offering a course. I put it together quickly. In my vision there would be no text for determining how to get a community on a self-sufficient basis, so I used a book called Environmental Design Science Primer, which is basically a methodology for research; it's a methodology in systems thinking. The plan

Excerpts from Teacher Interview, continued

was to use the system and translate it to problems that the students were focusing on: food, shelter and energy.

The class did accomplish a concrete thing: a thorough energy audit of consumption patterns and heat loss patterns. One student wants to continue on other major buildings at the school. In terms of shelter, we identified the major components of energy efficient structures and began cost accounting.

It emerged that students were in need of research and organizational skills. They worked well under direction and within the class as a whole group, but had difficulty working alone or in teams. All of these factors improved during the term, and the class did produce valuable information on self-sufficiency for the school as a whole.

A Selected Bibliography

Bender, Tom. Environmental Design Primer. New York: Schocken, 1976.

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Sample Course and Self Evaluation Questions

An important part of the work done in this course is an evaluation of the progress we are making. Would you please answer the following questions in detail, but please do not limit your evaluation to only the questions asked. Your comments will be a valuable addition to the evaluation procedure. Thank you.

1. Please comment on the goals established by the class.
2. Is the Design Science Primer a useful resource?
3. Have you used it for reference since the reading assignments were completed?
4. Comment on your personal progress in solving your problem.
5. Evaluate the individual effort you have made to achieve your goal.
6. Evaluate your effectiveness as a member of a design team.
7. What has been the most serious shortcoming of the course?
8. How can it be improved?
9. Have you used the available resources to the maximum?
10. What resources are least available? Most available?
11. How can you improve your learning experience in the weeks remaining?

Sample Student Response to Course and Self Evaluation Questions

I think the goals established by the class were good ones as far as trying to set up a self-sufficiency program for the school, however it seems obvious that there was a unrealistic time limitation for these goals.

I did not think design primer was a useful resource. I used only one chart in it for reference since the reading assignments were completed, and that was for another class. I think the systems and process given in the book were just rehashed material for me, since I have been using the same system given in the book for writing research papers since fourth grade although they weren't clearly understood by me until sixth grade. However, the book did give an outline around which to plan our goals and I think in this respect it was useful.

Sample Student Response, continued

I think I put in a fairly good amount of effort towards solving my goal, however. I could only read so fast. This factor held me back a little as I had a considerable amount of different factors to consider in designing a shelter and many different sources to consult. The sheer weight of this problem held me back a lot Once I got started things improved some, though. Energy Primer wasn't exactly armchair reading and I took a while to get started in it. Designing and Building a Solar House seems to be a much better source and is well put together. I will keep reading it when the course is over, I'm sure. The owner built home was the first book I've read than confronts the problem of ventilation and puts it in its important place. It certainly has some good construction parts but it really was just a rehash of design considerations for me. Overall I think I've gotten quite a bit from my reading.

I think my effectiveness as a member of a design team could be better, however in our case I rate it good. The most serious shortcoming of the course, in my eyes, was the fact that everyone couldn't work together and reach our final goals.

I used the available resources as much as I could. As I mentioned, however, I can only read so fast.

The resources I found least available were our library's supply of books pertaining to self sufficiency.

I think the class could increase group motivation and work together better to increase the group experience. I think Janet could help by contributing more of what she knows about the self-sufficiency topics in question. Otherwise I have no more suggestions presently.

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On the following pages:

Excerpts from a Sample Student Plan for

Self-Sufficiency

Tuesday 16 Jan.

Basic Problems:

energy — Kroe, [redacted]
food — Jenni
shelter — Dave [redacted] Arthur Kay, Tim M.
logistics
materials

Energy — Kroe, [redacted] Rogers'

heat | mechanical | electricity | manual labor

How much do we:
Use? need? waste?

what are the most appropriate sources?
new shelters
old structures

costs

evaluation of proposed solutions

Preferred Heat
cheap heat & power
non polluting
adequate
sustainable
cost effective

hold people warm & dry
how many per structure
how many structures
sq. ft.
complete electricity [redacted]
plumbing
composting toilets

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Self Sufficiency, Minimum Needs Arthur Kegerreis

I would want both hot and cold water indoor plumbing, a heating system preferably one which would require only initial cost with minor maintenance costs. I would want to be involved in every element of my houses construction so that I would be capable of carrying out any repairs that would need to be done. I would require electricity, mainly for reasons of music production & reproduction. I would want a scenic location, far enough from urban life to make home a quiet retreat, but close enough to it to make supplies and social life accessible. I would want a good portion of woods nearby, simply because of the simple pleasures of having forests nearby. If my source of income was insufficient for purchasing all foods, I would want land for grazing, cattle, pigs, and flat land good for gardening. I would want an potable water source nearby and last but not least, I would choose a climate that is warm in summer and snowy in winter.

a good idea

Arthur, if your income was insufficient for purchasing all food, it might very well be inadequate to buy all the land needed for your beasts and garden. What kind of food do you visualize for yourself? What does "all foods" mean? Would you be content without bananas if you live in a non-tropical climate?

You are on the right track in this project, but didn't spend enough time to make it a truly profitable exercise.

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Arthur Kagerer 1/23/7

Questions Basic to Structural Design Planning

1) How many people for each structure?
2) How many people for each room?
3) How many [redacted] for each structure?
4) How many rest rooms for each structure?
5) Existing sewage system vs. alternative system?
6) What qualities for each room and for lounge area are desired? I. Size II. View
7) What heating methods are to be used?
8) What type of structure is most
   - I. aesthetic
   - II. economical
     - a.) construction
     - b.) heat efficiency (to 7.) (passive)
   - III. Easily constructed
   - IV. Quickly constructed
9) What is the site to be?
   - I. Soil Qualities
   - II. Sun orientation
   - III. Drainage
   - IV. Aesthetics
10) Construction Materials; what is most
   - I. Durable
   - II. Strong
   - III. Weatherable
   - IV. Energy Effective
   - V. Economical

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Woodstock Self Sufficiency Arthur Kegerreis Feb. 5, 1979

Bibliography Books for Shelter/Energy Efficiency Planning Research

1.) Lupe Di Donna, P. Sperling How To Design And Build Your Own House
Alfred A Knopf New York 1978

2.) Eugene Ecclí Low Cost, Energy Efficient Shelters
Rodale Press, Inc. Emmaus, Pa #5.95

3) Ken Kern The Owner Built House
Scribners, NY 1975

4.) R. Merrill, T. Gage Energy Primer
Dell, NY 1978

5.) Ernest R. Weidhaus Architectural Drafting & Design
Allyn & Bacon, Boston 1972

6.) Frank Lloyd Wright The Natural House
Horizon Press, NY 1954

7) Donald Watson Designing & Building A Solar House: Your Place in the Sun
Garden Way Charlotte, Vt. 1977

Bibliography Evaluation March 16, 1979

Books 3, 4, 5, & 7 were read more thoroughly than the rest. #6 disappeared
#1 Looked more important to the implementation stage.
Book #7 was best for studying solar heating systems. It very clearly states all possible methods so far
Book #5 was best for studying building & structure design. It was clearest about housing design and contained lots of material in text book (unfortunately) form.
Book #4. Energy Primer had lots of information but it was not well organized for quick absorbtion
Book #3 Was not extremely good for design information but had some good building & construction information.
Book #1 seemed to have the best construction information.

WINTER TERM - Single Term Courses
SCIENCES

ENVIRONMENTAL DESIGN

This course dealt with the need for thoughtful intention, ethical evaluation, and aesthetic expression in the handling of every part of the environment. The scope ranged from planet to region to community to home to individual. One purpose of the course was to develop a land-use plan for the school.

Excerpt from Teacher Interview

This was a new course. It didn't get as far as I'd hoped. We used Design by Nature by Ian McHarg. It was useful, although some of the stuff was beyond the students. We wanted to get a land use plan done for the school, but we weren't able to complete it. We did get the mapping done and a questionnaire out to the community. We wanted to find out what people wanted and then survey what we had. Then we were to put them together and project where we would go.

A Selected Bibliography

Environmental Resources Management: Volume 2; Natural Resource Inventory - Goals and Policies. Sonoma County, California: Advanced Planning Division, Sonoma County Planning Dept., October, 1974.

Kern, Ken. The Owner-Built Home. New York: Scribner, 1975.

McHarg, Ian. Design With Nature. Garden City, New York: Doubleday/Natural History Press, Doubleday & Co., 1969.

"Plymouth, Vermont - Town Plan", Plymouth Planning Commission and Ottauquechee Regional Planning and Development Commission, HUD Project #CPA-VT-001-00-1003 (1), 1977.

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Summary of the Results
Land Use Survey

-Most students want animals primarily for vegetarian purposes: i.e., chickens for eggs, not meat; goats for milk and cheese, etc.

-A majority of students expressed interest in working the hay fields and putting the apple orchards back into production.

-Most are interested in growing our own staple vegetables, think it is worthwhile to invest in a greenhouse and are interested in aquaculture.

-Students would like to see the barn being used, preserved, and maintained.

-Most want to use the woods for lumber and logs and would like to do maple sugaring for our own syrup.

-Mixed feelings were expressed on how much time students are willing to put into the maintenance of the farm and the feeding of animals.

-The students use the woods mostly for walking, peace and quiet and fun. They would like to see horse trails, nature paths and cross country ski trails for recreation purposes. The majority felt the woods were appropriate for student housing and expressed a desire for cabins as the structures. Most felt regulations regarding student dwellings would be necessary.

-Most students saw the farm as part of both the curriculum and the self-sufficiency program. The building program was seen as part of the curriculum and there was also a desire for us to "just build them" expressed.

-The majority of the students would set aside preserved areas where no farming or building would take place. Also, they would like to see educational nature trails set up on campus.

-The great majority expressed a preference for living in a single room in a building with 4 or less people and would like to see faculty housing in the same building.

-A good view is important to the majority and most would prefer a valley view.

WINTER NATURAL HISTORY

This was a field course that investigated topics of interest to the individuals in the class. Possible topics included winter survival and camping techniques, plant and animal adaptations to winter, weather, ice, snow, pondlife, trees, tracks, tracking, insects, and fungi.

Excerpts from Teacher Interview

This is my most successful course. It's very well suited to what I'm trying to accomplish. I start off with game playing and values clarification things, and then I say, "O.K., what are we going to do?" We make a list, as a class, and then we vote. Then, over the next ten weeks, we do it. In the beginning, I chose what we do because I know how the season goes and what's available when. But they make the choice of how they're going to relate.

A lot was collecting, like tree and twig samples, drawing tracks, making castings, collecting and painting mushrooms, bird watching, keeping journals; like the first week we did trees, and the second, insects. So the interrelationship between what insects feed on what trees, and what birds eat what insects,

Excerpts from Teacher Interview, continued

or tracks of animals that may live in certain trees - etc., etc.

We went out one night, our last class, the moon was rising over East Hill and we wrote a poem. We were looking but we didn't see a whole lot. The wind was blowing and we talked about where we could get away from the cold. We crawled under a tree to get away. The course has to do with increased awareness as much as increased information.

A Selected Bibliography

Murie, Olaus J. A Field Guide to Animal Tracks. Boston: Houghton Mifflin Co., 1974.

Petrides, George A. A Field Guide to Trees and Shrubs. Boston: Houghton Mifflin Co., 1972.

Russell, Helen Ross. Winter Search Party: A Guide to Insects and Other Invertebrates. Nashville, Camden, and New York: Thomas Nelson Inc., n.d.

Stokes, Donald. A Guide to Nature in Winter. Waltham, Massachusetts: Little, Brown, & Co., 1976.

WINTER TERM - Single Term Courses
HUMANITIES

THE AMERICAN CIVIL WAR

This course was an examination of the causes, events, and ramifications of the Civil War. It involved a critical examination of various historical theories on the Civil War, and attempted to clarify the relative importance of slavery, northern capitalism, and westward expansion to the Civil War.

Excerpts from Teacher Interview

It was an exercise in critical historical judgment. The subject lent itself to that more than other periods because the causes are still debated. We used a series of scholarly essays which reflected different points of view about the war.

This teacher felt the importance of presenting as many interrelated factors as possible, for an effective treatment of an historical topic.

For example he felt it was important for them to realize that the south, being a one-crop economy, depleted its soil, and as a result was a major instigator in the westward expansion. The northeastern states were less anxious to do so, and appeared humanitarian on the issues of Indians and the systematic obliteration of the tribes. However, it has to be taken into

Excerpts from Teacher Interview, continued

account that the northern economy was more stable, and that the New England tribes had already been obliterated. Social values were also a factor. A more progressive attitude was inherent in the northern outlook while the south remained conservative. The south was agrarian, and its stability came from being landed. The north valued its land too - but for buying and selling, for speculation and not for agriculture.

His continual weaving of the complex factors allowed for a holistic presentatior of the subject.

A Selected Bibliography

Primary Text:

Henry F. Bedford and Trevor Colburn _The Americans - A Brief History to 1877_. New York: Harcourt, Brace, Jovanovich, Inc., 1972.

Secondary Texts:

Brown, Richard D., Editor. _Slavery in American Society_. Lexington, Massachusetts: D.C. Heath & Co., 1976.

Rozwenc, Edwin C., Editor. _The Origins of the American Civil War_, Second Edition. Lexington, Massachusetts: D.C. Heath & Co., 1972.

EARLY CULTURE

This course focused on the development of four pre-civilized cultures: the Phoenician sea traders, the Hittite Empire, the Scandinavian northmen, and the Celts.

Excerpts from Teacher Interview

I designed it to start with Sea Traders (Phoenicians), then moved to the other books - The Celts, The Empire Builders (Etruscans), and The Northmen (pre-Vikings). These were the core books I had selected to represent geographical area during the period of pre-history.

I was interested in concepts instead of facts and figures, or dates. We looked at food, shelter, clothing, and social arrangement. We talked about life-style and how, in some cases, they affected the environment. For example, in terms of social arrangement, there were some interesting differences. The Phoenicians and Celts were not tied to a geographic area. There was no centralized political and economic control. With empire building, the dynamics changed; they needed an agricultural base.

I tried having the class do mini-research projects and present them in class. As usual some did minimal research, and

Excerpts from Teacher Interview, continued

others did fairly elaborate and extensive projects. Some of the reports included reports on Hammurabi, the Epic of Gilgamesh, ancient music, and the roots of the Bible. I feel I got in over my head. I really don't have enough historical background to do what I wanted to do. I still think the idea is a good one. One of the faculty who teaches history is going to pick up on some of this material.

A Selected Bibliography

Edey, Maitland. The Sea Traders. Emergence of Man Series, Time-Life Books. Morristown, New Jersey: Silver Burdett Co., 1972.

Froncek, Thomas. The Northmen. Emergence of Man Series, Time-Life Books. Morristown, New Jersey: Silver Burdett Co., 1974.

Hicks, Jim. The Empire Builders. Emergence of Man Series, Time-Life Books. Morristown, New Jersey: Silver Burdett Co., 1974.

Taylor, Duncan N. The Celts. Emergence of Man Series, Time-Life Books. Morristown, New Jersey: Silver Burdett Co., 1974.

Sample Quiz: The Empire Builders

1. Which of the following is false?
   A. In about 1300 B.C. the Hittite Empire was at the height of its power and size.
   B. At the height of its power, the Hittite Empire covered the entire region known as Anatolia which is present-day Turkey.
   C. At the height of its power, Hittite hegemony encompassed an area almost the size of modern France and England combined.
   D. Hittite imperialism was characterized by brutality toward conquered peoples and total destruction of their culture and way of life.
   E. None of the above.

2. True or False: In matters of state, Hittite rulers proved themselves generally to be poor diplomats and preferred the use of force in dealing with their neighbors and enemies.

3. True or False: The Hittites were the last in a long line of ancient peoples to build and maintain an empire.

4. The Hittite Empire had a strong legalistic base which encouraged and emphasized justice and retribution rather than revenge. True or False.

5. True or False: War chariots and Hamath stones were the principle weapons used by the Hittites in siege warfare.

6. True or False: Hittite hieroglyphs were extremely difficult to decode because the Hittites left very few written records.

7. True or False: Hittite hieroglyphs have proved to be among the easiest of ancient writings for scholars to translate.

8. True or False: The principle deity worshiped by the Hittites was the Storm God known by the name Teshub.

9. True or False: The Hittite pantheon contained many gods and goddesses who were attributed with weaknesses similar to those of ordinary mortal as well as supernatural powers.

Sample Quiz, continued

10. True or False: As a direct result of a decisive victory by the Egyptians at the Battle of Kadesh, the Hittite Empire entered into a period of rapid decline.

11. The Egyptian-Hittite alliance made in 1284 B.C. was one of the earliest examples of a formal diplomatic non-aggression, mutual-defense treaty between two major powers. True or False.

12. The sudden collapse and disappearance of the Hittite Empire in about 1200 B.C. is attributed to massive invasions by hordes of crazy hippies on their way to a rock concert at the colosseum in Rome. True or False.

Sample Student Paper

The Celtics were a large group of peoples spanning over a vast area of Europe. They dwelt in what was then known as gaul, which is Northern Italy, and in the countries of France, Spain, England, Wales, Scotland, Ireland, Switzerland, the Rhineland, and on raiding forays they pushed as far as Asia Minor.

The early period of the Celts was known as the Hallstast period this was around 400 to 250 B.C. It is known as Hallstast because it is identified by works of art found in this area. Their art at this time consisted of Geometric and Abstract Form, with the basic design containing many swirling and intertwining linear forms.

These people are known as the celts because of a culture they held in common. They never identified themselves as such. They were a tribal people, and these tribes held most others in the view of an enemy.

The height of the Celtic people as a whole began with the La Tene period. Again called as such for the form of Art. This art made use of the same swirling linear patterns but often, they were placed in identifiable outlines of animals or people. The medium of their art was predominantly in metal works. Bronze, silver, and gold.

The Celts were excellent workers of iron, they made the transition from bronze to iron and became more adept than many other people in the world in the fashioning of utilitarian tools as well as weaponry. It was the advent of iron that led them to invent the iron plow. Which was a giant step forward in agriculture. Reducing the labor of making beds by far and enabling the farmer to turn up soil from down deep increasing the use of their acerage.

They were an Agrarian culture. The tribes had the equivalent of a King who was chosen for his prowess in war, his wealth and of course his status in the noble class. Thy believed that the king was chosen through divine intervention. Once chosen the king had great responsibility, and could easily fall out of the grace of the Gods, where in his fellows would promptly remove him. He had to maintain a perfect physique, a judicial countenance, and ability to battle. Beneath the King were the Noble Class. A Noble family ranged from a Great Grandfather down on to all his existing descendents. The nobleman was a warrior and a "Farmer" however it is unlikely he did much farming by himself. Beneath him were Freemen who in turn for several

Sample Student Paper, continued

years labor stints received shares of land and cattle. beneath the Freemen were the equivalent of Fudal serfs who never achieved any greater status than that and then as bottomline was the slaves, who were made up of the lowlifes and captives.

A practice that existed mainly amont the Noble classes was that of "apprenticing" (forget the actual term) their children to other familys where according to status the children would learn the various necessities of Celtic livelihood. A Noblemans son, would learn to hunt, embattle and some scholarly pursuits as well. The woman of a peasant family would learn to weave, bake, etc.

The Celts, from early on in their history, had contact with the Greek and then Roman Civilizations. They engaged in trade. They were especiasly fond of the Greek wine. Thy also from time to time did battle with them. Historians more often than not extoll upon the incredible ferocity fervor and ecstatical intensity with which the celtic man fought. With blazing red hair, naked but for a tourque and a spear.

The religion, and science of the celt, (the two were as one) were dealt with by the Druids. Wandering Wizards who took care of the ceremonial rites, and the judicial decisions of the people. They enshrouded themselves in mystery and passed on their teachings only. They participated in a bizarre cult which was centered around a belief that the human head was the embodiment of soul. They were known to indulge in human as well as animal sacrifice.

The decline of the Celts came about with the Political and Military Carreer of Caesar, and invading German and teutonic peoples of the North, the last stronghold was Ireland, where the culture was pure right up until the 4th century, when came christianity and the Norse invaders. Celtic influence persisted right up until the 16th century and is still alive Today.

THE U.S. IN AN INTERDEPENDENT WORLD

This course was an examination of the reality of global interdependence and its opportunities and responsibilities for Americans. The major issues were raised by a study of the two sides of the "limits to growth" controversy: the thesis of the Club of Rome elaborated in its second report, Mankind at the Turning Point, and a response to that position found in Herman Kahn's The Next 200 Years. The values questions which arise from the existence of the U.S. as an industrial technology were clarified by a group of essays by different thinkers in The Technological Threat. Alternatives to a high energy technology and the values which it represents were suggested by E.F. Schumacher's Small is Beautiful and Humanist Manifesto II. The course concluded with an exploration of the various possibilities of U.S. response to the problems identified by two Foreign Policy Association pamphlets and Rufus Miles' Awakening From the American Dream.

This course was handled somewhat differently than in previous years. The teacher decided to focus on the issue of food and world hunger and starvation. It was an attempt to bring the policies and practices of the U.S. into sharp relief so as to make the interdependencies more obvious to students. The teacher's

Course Description, continued

comments which follow are an indication of his view on the matter, as well as an indication of the course's content.

Excerpts from Teacher Interview

I think that its strength was also its weakness. The Hunger Symposium was clearly the high point and something that no other group of students had done. There was a tremendous sense of satisfaction for them. On the other hand, the concentration on the symposium meant that we did not spend a lot of time on other issues, as we did on food and hunger. So by deciding at the beginning of the term and evolving course material around a uniform focus for the class's research and reports, we did not delve into issues that had been raised in previous "interdependent" courses. I'm not sure that our class discussions were as fruitful as they had been in other terms because we spent so much time on that particular issue.

The general feeling with the course was one of satisfaction. Those who were expecting a more theoretical course like "Utopias", or "Man and Technology", were frustrated by its specificity.

Excerpts from Teacher Interview, continued

I explained to them that it was meant to be that way. We looked at very specific kinds of issues and concerns, like what is happening each day in terms of international relations with Nicaragua or Pakistan. We looked concretely at our responsibilities as Americans, and that meant statistics, concrete global awareness, reading newspapers, etc.

A Selected Bibliography

Bloomfield, Lincoln P. and Irangi C. The U.S., Interdependence and World Order. Foreign Policy Association Headline Series Pamphlet.

Douglas, Jack D. The Technological Threat. 1971 (out of print)

Kahn, Herman. The Next 200 Years. New York: William Morrow & Co., Inc., 1976.

Manning, Bayless. The Conduct of U.S. Foreign Policy in the Nation's Third Century. Foreign Policy Association Headline Series Pamphlet.

Mihajlo Mesarovic and Eduard Pestel. Mankind at the Turning Point. New York: New American Library, 1976.

Miles, Rufus E., Jr. Awakening from the American Dream. New York: Universe Books, Inc., 1976.

Schumacher, E.F. Humanist Manifestos I and II. Buffalo, New York: Prometheus Books, 1973.

Schumacher, E.F. Small is Beautiful. New York: Harper & Row, 1976.

Reading Assignments

Date Due		Reading
January	9/10	Mesarovic and Pestel, pp. vii-31 (Preface & Chapters 1-3)
	11	Mesarovic and Pestel, pp. 32-69 (Chapters 4 & 5)
	12	Mesarovic and Pestel, pp. 70-100 (Chs. 6 & 7)
	15/16	Mesarovic and Pestel, pp. 101-129 (Chs. 8 & 9)
	16/17	Mesarovic and Pestel, pp. 130-157 (Chs. 10 & 11)
	18	Kahn, pp. vii-25 (Preface & Chapter I)
	19	Kahn, pp. 26-57 (Chapter II)
	22/23	Kahn, pp. 58-83 (Chapter III)
	23/24	Kahn, pp. 84-138 (Chapters IV & V)
	25	Kahn, pp. 139-180 (Chapters VI & VII)
	26	Kahn, pp. 181-228 (Chapters VIII & IX & Appendix)
	29/30	PAPER DUE
	30/31	Xerox Packet #1: Introductory Material and Selected
February	1	Xerox Packet #2: Essays from Technological Threat
	2	Schumacher, pp. 1-39 (Intro, Chs. 1 & 2, Part 1)
	5/6	Schumacher, pp. 40-75 (Part 1, Chs. 3-5) MID TERM SELF-EVALUATION DUE
	6/7	Schumacher, pp. 79-117 (Part 2, Chs. 1 & 2)
	8	Schumacher, pp. 118-145 (Part 2, Chs. 3 & 4)
	9	Schumacher, pp. 146-159, 163-190 (Part 2, Ch. 5 & Part 3, Chs. 1 & 2)
	12/13	Schumacher, pp. 191-220 (Part 3, Chs. 3 & 4)
	13/14	Schumacher, pp. 223-253 (Part 4, Chs. 1 & 2)
	15/16	LONG WEEKEND
	19/20	Schumacher, pp. 254-271 (Part 4, Chs. 3 & 4)
	20/21	Schumacher, pp. 272-297 (Part 4, Ch. 5 & Epilog) Humanist Manifesto II, pp. 13-24
	22	PAPER DUE
	23	Miles, pp. ix-44 (Preface, Intro, Chs. I & II)
	26/27	Miles, pp. 45-75 (Chs. III & IV)
	27/28	Miles, pp. 76-103 (Chs. V & VI)
March	1	Miles, pp. 104-135 (Chs. VII & VIII)
	2	Miles, pp. 136-169 (Chs. IX & X)

Reading Assignments, continued

5/6	Miles, pp. 170-207 (Chs. XI & XII)
6/7	Miles, pp. 208-236 (Chs. XIII & XIV)
8	PAPER DUE
9	Bloomfield, pp. 3-34
12/13	Bloomfield, pp. 35-61
13/14	Manning, pp. 3-49
15	Manning, pp. 50-80
16	CREDO DUE
	SELF- AND COURSE EVALUATIONS DUE

Sample Student Paper: Small is Beautiful

The main point Schumacher is trying to get across is summed up in the title - Small is Beautiful. He feels that private enterprises are getting so large that it is taking away from individual and personal involvement. What man once did with his hands and could take pride in, is now being replaced by machinery or multitudes of people, because the businesses have expanded so. As Theodore Roszak says in his introduction to the book: "More and more their growthmania distorts their environments and robs the world of its non-renewable resources for no better end than to increase the output of ballistic missiles, electric hair-dryers and eight-track stereophonic tape recorders."

I agree with this completely and think it's a shame that more and more, people are obtaining jobs doing things they are not necessarily interested in or don't have a deep passion for. They are going into an area which will bring them the most money, which will then bring them their new cars and stereos or whatever. But there are still the people, such as those in Guatemala, who spend hours embroidering beautiful clothing or weaving intricate baskets, who probably make only around nineteen cents an hour, less than what someone would get stuffing cotton in aspirin bottles, which does not take much skill.

In this respect, I do not see the United States in any position to help the third world countries or even give them suggestions. I feel for the most part, that this country has lost what is of real value. In a way, these poorer countries might be better off than us, simply because they are not as money hungry and are still doing much with their own hands. I'm sure this gives them much more personal satisfaction than the materialistic items we have. What Schumacher points out about "the best aid to give is intellectual aid, a gift of knowledge", is good. But it is not just for us to give. We could receive some of this aid from the third world countries as well as their receiving aid, perhaps or birth control, from us. But it should be something we work out in a way that is helpful to all countries including ours, instead of this country thinking it is on top of everything and knows the best solutions to all problems. We could stand some advice from other countries, and putting all our heads together, perhaps something could be accomplished. "There is plenty of flow of know-how, but it is based on the implicit assumption that what is good for the rich must obviously be good for the poor." Or that the rich are right and the poor are wrong.

Student Paper: Small is Beautiful, continued

As Schumacher says, "a great effort of imagination, study, and compassion is needed." I truly cannot see any of this taking place, until people start to realize that money isn't everything, and that doing a job you love, is.

Student Paper: G.F. Schumacher, Summary and Critique

It seems Schumacher is saying we should turn to small, simple and cheap technology rather than continuing monstrous expensive and incomprehensible technology. He says our economics should revolve around Humanity and Nature. He mentions that the way we ought to help less developed countries is not by giving them products of our western world but by showing them the means by which we come by those products.

Schumacher also states that education is the greatest resource. However it must be put to proper use. Education is only the tool by which we gain knowledge. Or, to quote a phrase, "Education is no more knowledge than a piano is music".

I find it quite surprising, but I seem to agree with almost everything Schumacher has to say in this book. As well as agreeing with him I learned a lot from him, particularly about Buddhist economics. I like the idea of considering both immediate experience and long term prospects when dealing with economics. I think Buddhist economics could be an answer to many of our problems.

Schumacher's belief that education is our greatest resource is interesting, and I agree that we may gain knowledge through it. However, for some reason I don't think education is the only way to gain knowledge. I believe we can gain knowledge just by the process of living.

I think this book gave one of the finest anti-nuclear energy reports I have ever read or seen. It showed just how economically infeasable nuclear power is. If any of those pro-nuke people read this book I am quite sure they would at least see the problems involved and perhaps they would even change their views. (Of course its hard to predict anything about those guys).

Student Paper: G.F. Schumacher, Summary and Critique, continued

The ideas about intermediate technology are fascinating, and I think they could be economic solutions for the entire world, not only the developing nations. Sometimes I wish all the countries were what the western world considers "Poor"; perhaps then we could all adopt intermediate technology.

I like the thought of development being much wider and deeper than economics. However I don't know if I agree that "its roots lie in education, organisation, discipline, political independence, and a national consciousness of self reliance," because I somehow get the feeling that the last two of these can lead to wars. I do agree at any rate, that "success cannot be obtained by some form of magic produced by scientists, technicians, or economic planners," but depends upon the outlook of the people themselves.

The most important thing said in this book is that we don't need electricity, cement and steel before we can do anything. I think the western words is so caught up in the "keen" things we can do with our technological toys that we don't realise that most of our products are mere commodities which we can easily do without. Not only should we not teach the underdeveloped nations our destructive technology, but we should do away with it ourselves.

I do remember Schumacher mentioning it, but I don't recall him stressing the idea that as well as letting the third world develop its own culture and technology, the western world should undergo a reversion and maybe even follow the egsamples of developing countries. Our Technology has taken us so far on such an incredibly useless and stupid tangent, that I believe it is time to scrap it and try something new. Something like the technology with a human face.

A great book.

THE HUNGER SYMPOSIUM: WEDNESDAY MARCH 7, 1979

The Hunger Symposium culminated a term's work in "The U.S. in an Interdependent World".

The entire school was invited to join the class in a 24 hour fast which started after lunch on the day preceding the symposium. On Wednesday the class set up the gymnasium with exhibits of student papers and projects, which included a table laden with every conceivable product made from the soybean, a comprehensive graph of world population doubling figures, as well as a futuristic look at colonies in space. In the afternoon the class and volunteer participants from the school community spent several hours playing the world politic simulation game, "Guns or Butter", which, to the surprise of the participants, ended with the annihilation of the world by atomic warfare. Two films on world hunger were shown in the evening.

The dinner that ended the fast was prepared by students in the class for the entire school, and was designed to exemplify the plight of the hungry in the third world. The class cooked and served three different dinners in unequal proportions. The first dinner was rice and cabbage, the second a curried lentil dish, and the third a classic American steak dinner.

The Hunger Symposium, continued

Most people got rice and cabbage, which was the most plentiful. A few got curried lentils, and one plate at each table was the steak dinner. Finally, one plate at each table was left completely empty. As students, guests and faculty entered the dining hall, the plates were covered with napkins so that it was impossible to tell to which dinners they were sitting down. Nothing in the whole day's activities brought home so completely to the whole community the intricate nature of world hunger and the kind of psychological impact it has on the "haves" as well as the "have-nots".

Interested persons within and beyond the community took part in the day's activities. We have appended Hunger Symposium's schedule.

We were able to obtain ten of thirteen papers by student exhibitors. The titles are appended herein, as well as several bibliographies which accompanied the papers. We have included these bibliographies as they were written by the students.

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Hunger Symposium Schedule

1:00 End of 24 hour feast to contribute to the end of world hunger - funds saved to be donated to Hunger Relief Agency.

1:15 - 2:15 Exhibits on World Hunger and Related Issues

1. Pesticides
2. And What of Waste? (Human Waste Disposal)
3. The Green Revolution
4. Hunger and Famine Aid Agencies
5. Food Attitudes
6. Space Colonies
7. Energy Sources and Impact on Agriculture
8. Aquaculture
9. Food and U.S. Foreign Policy in Latin America
10. Wheat
11. The Noble Bean (soybeans)
12. U.S. Meat System and the Third World
13. Population Issues

2:30 - 6:00 Guns or Butter Simulation Game
Developed by William A. Nesbitt for Grades 9-14;
15-25 players, 3 hours. $25
Available from Simile II, P.O. Box 1023, La Jolla, California, 92037. 714-755-0272.

6:15 Third World Dinner

7:15 Two films:
"The Right to Eat", 30 mins., 16 mm, from SRS Communications, 4224 Ellenita Ave., Tarzana, California, 91356.
"Diet for a Small Planet", 28 mins., 16 mm, from Bullfrog Films, Inc., Oley, Pennsylvania, 19547.

Student Bibliographies, Samples

Why Wheat?

Brown, Lester; Eckholm, Eric. By Bread Alone, Praeger Publishers, New York, 1974.
Bumgarner, Marlene Anne. The Book of Whole Grains, St. Martin's Press. New York, 1976.
Encyclopedia Britannica, vol. 23, 1969.
Merrill, Richard. Radical Agriculture, Harper & Row Publishers, New York, 1976.
Trager, James. Amber Waves of Grain, Arthur Fields Books, Inc. New York, 1973.
Hunger: Man's Struggle to Feed Himself. Book Not Available for Bibliographic Reference.

The U.S. Meat System and its Effects on the Third World

Diet for a Small Planet, Frances Morre Lappe.
The Science of Animals That Serve Mankind, Rice and Hok.
"Animal Productivity", A Study by the National Research Council.*

* Thank you Dartmouth.

Pesticides

Baker, Elaine. Starving - Analogy of a political problem, Viking Books, New York, New York. 1976.
Briscoe, Jonathan. An Overview of the World Food Scam, Ballantine Books, New York, New York. 1977.
Harriman, Arthur. Mexico Updated, Penguin Books, Philadelphia, 1977.
Robbins, William. The American Food Scandal, William Morrow & Company, New York, New York. 1974.
Simon, Arthur. Bread for the World, Paulist Press, William B. Friedmans Publishing, Grand Rapids, 1975.
"Supporting Papers: World Food and Nutrition Study", Oxford Publishers, New York, New York, 1978. Volume I.

Student Bibliographies, continued

Space Colonies

Dividends from Space By Ordway, Adams and Sharpe. Thomas Y. Cromwell Company. New York. 1971.
The High Frontier By Gerald K. O'Neill. William Morrow and Company, Inc. 1977.
Space Debate New Age Journal. December 1976 issue. New Age Communications, Inc.
Establishment of Space Colonies Inevitable, New York Times. Thursday February 16, 1978.
Energy Producing Satellite Experiments Urged Columbus Citizen Journal. Thursday February 9, 1978.
Space Colonization: An Invitation to Disaster? By Paul L. Csonka. The Futurist, October 1977.
An International Decade of Energy Alternatives By Neil F. Ruzic. The Futurist Feb. 1978.

Food Attitudes

Affluence and Anxiety, Carl Degler, Scott, Foresman & Co., 1975.
Four Arguments for the Elimination of Television, Jerry Mander, Morrow Quill Paperbacks, New York, 1978.
Man Transforms, Hans Hollein, Cooper-Hewitt Museum, October 1976.
New York Times, Human Life Can Prosper with Spartan Ways, Rene Dubos, Jan. 6, 1975.
Patterns of Culture, Ruth Benedict, Houghton Mifflin Company, Boston, 1934.
Radical Agriculture, Richard Merrill, Harper & Row Publishers, New York, Hagerstaun, San Francisco, London, 1976.
Small is Beautiful, E.F. Schumacher, Harper & Row Publishers New York, Hagerstaun, San Francisco, London, 1973.
"The New U.S. Farmer", Time Magazine, Nov. 6, 1978.
"The Oceans in our Future", Larry Booda, The Futurist, August 1977.
The Silent Language, Edward T. Hall, Anchor Press, Doubleday, Garden City, New York, 1973.
Wall Street Journal, "Getting Off the Treadmill", James D. Gannon, April 12, 1974.
World Atlas of Energy

SPRING TERM - Single Term Courses
WHOLE LIFE SKILLS

HOMESTEADING

This course was designed to fit individual needs (vegetarian and non). It included learning about dairy goats, rabbits, chickens, pigs, ducks, gardening, storing produce (root cellars, canning, freezing, drying), buying land, setting-up, fencing, etc. It was time-consuming - extra hours for doing (making cheese, milking goats, etc.) It included a final exam and projects and numerous field trips.

Excerpts from Teacher Interview

For a text we're using Country Women. It's not only for specific information that's in it but for the journal excerpts written by women who are homesteading. It allows pertinent information, like about post-hole digging, and the journal comment might say how hard the work was and how tired she is.

We've taken a lot of field trips, and I focus them to be real learning experiences. We went to one farm where the woman has learned homesteading by visiting and seeing how other people do it. She does the farming, and her husband, who is a dentist, does the bartering. They have an herb garden, keep sheep for spinning, have chickens for eggs and for broilers.

Excerpts from Teacher Interview, continued

She has bee hives, makes yogurt and cheese, keeps a root cellar, and makes her own pottery. Her husband barters for milk and meat. That's how they sustain themselves economically.

We went to a rabbit farm where they breed rabbits for meat for their family, and work the compost from the rabbits. They have an incredible garden. At another place, they raise grains and use mules and horses for plowing.

We've also done a lot of kitchen work; for example, we've made goat's milk ice cream and cheese. We've exchanged recipes for breads, yogurt and granola. Other faculty have talked to us about things like gardening and alternative energy for homesteading.

At this point we're doing one thing at a time but I think the kids are getting a good overview. I alternate lectures with field trips, which helps us to decide what kinds of things we want to try and do.

This was a new course taught only in the spring term which had its antecedent in the fall activity offering called home farming.

A Selected Bibliography

Belanger, Jerry. Raising Milk Goats the Modern Way. Charlotte, Vermont: Garden Way Publications, 1975.

Cohan, Ray. How to Make it on the Land. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972.

Emery, Carla. The Old Fashioned Recipe Book: The Encyclopedia of Country Living. New York: Bantam Books, Inc., 1977.

Laurel, Alicia Bay. Living on the Earth. New York: Random House, 1971.

Logsdon, Gene. Homesteading: How to Find New Independence on the Land. Emmaus, Pennsylvania: Rodale Press, Inc., 1973.

Nearing, Helen and Scott. Living the Good Life: How to Live Sanely and Simply in a Troubled World. New York: Schocken Books, Inc., 1971.

Robinson, Carolyn and Robinson, Eds. The Have-More Plan. Charlotte, Vermont: Garden Way Publications, 1973.

Robinson, David. The Complete Homesteading Book: Proven Methods for Self-Sufficient Living. Charlotte, Vermont: Garden Way Publications, 1974.

Scher, Les. Finding and Buying Your Place in the Country. New York: Macmillan, 1974.

A Selected Bibliography, continued

Jean Tetrault and Sherry Thomas. Country Women: A Handbook for the New Farmer. New York: Doubleday, n.d.

Vivian, John. The Manual of Practical Homesteading. Emmaus, Pennsylvania: Rodale Press, Inc., 1977.

Reference Periodicals:

Vermont Life

Country Journal

Yankee

Organic Gardening

Mother Earth News

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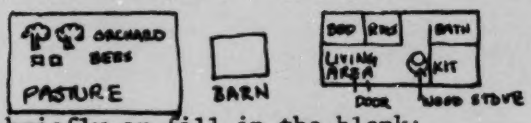
Example of a Final Exam

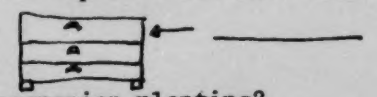
Answer in essay form:

1. Would you prefer to build a new homestead dwelling or fix up an existing one and why?
2. Please do a drawing of your homestead dwelling explaining water sources, electricity or none, etc. i.e., energy source. Be as specific as possible - show where you keep goats, other animals, etc. Example:



Answer briefly or fill in the blank:

1. One point equals _____ lb./s of goat's milk.
2. Draw a milking stanchion explaining how to use for goat.
3. What are good times to milk goats _____AM
   _____PM
4. What breed are our goats?
5. Why would it be best to wait to use solar energy until the mid-'80's on your homestead?
6. What are the "cons" of wind power for the homesteader?
7. Would you use a conventional toilet, an outhouse, or a composting toilet, and why?
8. What is an annual plant?
9. What is a biannual plant?
10. Explain the basics of French Intensive Gardening.
11. What is the top of a bee hive called?



12. What is companion planting?
13. How would you organize this course?
14. Please draw how you would set up your chicken house if you had 12 chickens.
15. What does "sexed chicks" mean?
16. Tell how to put up fencing - what tools you would use.
17. Why do you think homesteading is a good (or bad) idea?

SPRING GARDENING

The class prepared flats of seedlings for transplanting, and also prepared French Intensive raised beds in the garden. Principles of plant nutrition, soil health, composting, and companion planting, were covered.

Excerpts from Teacher Interview

Gardening is a system within the garden itself, and that's most easily observed in companion planting and rotation. That which went before affects that which comes now, and what we do now is affected by plants' interactions with each other.

In gardening, I want them to be conscious of the fact that it is an intrusion on a natural system. Therefore, one has to construct a garden that is as compatible as possible with that system.

As far as discussing environmental implications, I didn't require this class to read Wendell Berry. I do point out the energy-intensive nature of agri-business. Also, that in the future, regional agriculture will be of greater importance than now because of fuel shortages.

This teacher commented to the importance of working relationships when commenting on building a small geodesic greenhouse and fencing.

Excerpts from Teacher Interview, continued

This year we have the addition of a donated greenhouse. That added new dimensions in terms of having students work cooperatively as a team. A dome requires a simultaneous effort of work. It gave the students a practical experience in geodesic shapes. They didn't realize that each piece strengthened the rest and that became very visible as we were putting it up. I would recommend the activity as an excellent experience in systems, in team work. The class also worked on fencing, which was a new element in the class and also required team work.

A Selected Bibliography

Jeavons, John. How to Grow More Vegetables than you ever thought possible on less land than you can imagine. Palo Alto, California: Ecology Action of the Midpeninsula, 1974.

Sample Garden Notes

Light feeders - root crops generally, sweet potatoes

Heavy feeders - leafy greens, corn, brassicus family. Peppers, but avoid too much nitrogen.

Heavy givers - peas, beans, vetch, alfalfa and clover.

Major nutrients -

Nitrogen - (N) - present in manure, urine, blood meal, cotton seed meal. Fixed in the soil by nodules on the roots of the heavy givers: peas, beans, etc. The nitrogen fixing capabilities of these plants can be enhanced by "innoculation", which comes in powder form, is then mixed with water. The seeds are soaked overnight before planting, in the innoculant/ water mix. This cannot be done more than 24 hours ahead of planting or the seed will be ruined. Nitrogen encourages leafy growth. An excess will cause flowering plants such as broccoli, peppers, etc., to put too much energy into leaves and set too few flowers and fruit.

Phosporus - (P) - present in bone meal, rock phosphates. Necessary for well-formed flowers, strong and healthy stalks. The plant nutriment most likely to be in short supply in the soil.

Potassium or potash - (K) - Important in good growth of root crops. Also aids in healthy cell walls, strong stems, aids maturing and seed production. The nutrient most likely to be naturally abundant in soils. Supplied by granite dust, greensand, wood ash.

Calcium - Usually plentiful in soil, but leaches out easily when the soil is disturbed. Egg shells, dolomite limestone, wood ashes (some), bone meal. One of the most important trace elements in the soil. Needed for the ion exchange that drives all biochemical events in the soil.

Importance of Organic Matter in the Soil: Provides food for beneficial insects such as worms, certain bacteria. Aids in holding water in the soil. Helps soil texture remain loose. Deters erosion. Makes nutrients present in soil available to plants due to complex biochemical activity

Sample Garden Notes, continued

that occurs when organic matter decays. Uncomposted organic matter high in carbon, such as sawdust, can tie up nitrogen present in the soil, as it uses a ratio of 30 carbon to 1 nitrogen in the decay process. Used as a mulch on top of the soil, however, sawdust can be mixed with a little blood meal and no danger of nitrogen deprivation will occur.

Beets: will not tolerate an acid soil. Do not require heavy nitrogen, but have deep roots so soil should be well dug. Require full sun. Are frost tolerant. Companions: lettuce, bush beans, onions. Antagonists: pole beans, mustard.

Carrots: Not as particular as beets about acid soils. Approximately the same nutrient requirements as beets: light nitrogen, plenty of phosphorus and potassium. Full sun, frost tolerant. Very small seed should be mixed with sand for sowing. Beds should be lightly mulched while germinating, to prevent drying out. Companions: lettuce, onions, sage. Antagonist: dill.

Sample Tables: Companion Plants

Bush beans - get some strawberry plants - interplant beans - dry
Pole beans - Savory
Beets - onions
Brassicus - herbs and calendula - sage, onions
Carrots - sow a few in peas, fill spaces with lettuce
Celery - plant near tomatoes
Corn - cucumbers
Cucumbers - radishes, sunflowers
Eggplant - beans
Leeks - onion, celery, carrots
Lettuce - carrots, radishes
Peas - carrots, turnips
Soybeans - helps everything - interplant in all empty spaces
Spinach - strawberries
Sunflower - with the cucumbers
Tomatoes - plant marigolds, nasturtiums, basil
Turnips - in the peas -
Sow: catnip to deter flea beetles
dill in cabbage
hlyssop deters cabbage moth
mint - plant near cabbage
marjoram - here and there
nasturtium - squashes and bean sprouts (deters aphids)
calendula (pot marigold) - good all over
Summer savory - good all over
Tansy - flying bugs - japanese beetles - (grows tall and can be invasive)

Excerpts from Planting Tables

Pepper - California Wonder (Z)
Tomato - Earliana (TJ)
Pepper - Hungarian Wax
Eggplant - Early Black Egg (X)

All sown 4/3/79 in 3" peat pots

VARIETY	DATE PLANTED	AMOUNT PLANTED
Nicotiana Sensation Mixed	4/13	small flat
Nicotiana Tinkerbell	4/13	small flat
Lobelia Crystal Palace	4/13	small flat
eaten by mice:		
Zinnia - Miss Wilmot (ZW)	4/13	peat pots
Zinnia - Giant Mixed (ZM)	4/13	peat pots
Marigold - Jubilie: eaten by mice	4/13	half flat
Zinnia Giant Mixed resown	5/5	
Savory	5/12	small flat
Marjoram	5/12	small flat
Basil - Johnny's	5/14	small peat box
Marigold - Happy Face: eaten by mice	4/13	half flat
Spanish Brocade	5/12	one flat
Calendula	5/14	4 small peat
Bush green beans - Greencrop 48 days	6/1, 6/3, 6/4*	2 triangle beds
*last batch treated with innoculant		
Champagne Pole Beans	6/6	2 poles, behind corn
Kentucky Wonder Pole Beans	6/9	between peas, south
Early Wonder Beets	5/27	½ bed in onion bed
Detroit Dark Red	6/6	1 small bed
drought since planted - watered 5/11		
Northrup/King Sugar Lump Tomatoes	4/13	peat pots
Yori Spring Turnips	6/6	between 2 poles N

Excerpts from Planting Tables, continued

VARIETY	DATE PLANTED	AMOUNT PLANTED
F1 - Hybrid Bravo Broccoli	4/20	1 Flat
E.D. Danish Brussels Sprouts, 150 days	6/10	speeding flat (32)
WIDI Cabbage	4/20	½ flat
Nozuki Early Chinese Cabbage	4/20	
Victory F-1 Cucumber	5/14	½ row
Lemon Cucumber	5/14	½ row
Lemon Cucumber	6/5	scattered
Siegfried Leek - 105 days	6/9	near tomatoes
Bibb Kagran- summer Lettuce	4/20	¼ flat
Romaine Cosmo Lettuce	4/20	¼ flat
Prize Head Lettuce	4/20	¼ flat
Black Seeded Simpson Lettuce	4/20	¼ flat
Sweet Granite Muskmelon	5/12	4 peat pots
Delicate Original D.O. Parsley	4/20	small flat
Beagle Peas	5/11	1½ poles N
WANDO Peas	5/11	½ pole
Sugar Snap Edible Pod Pea	5/11	1 pole
Oregon Sugar Pod Pea	5/14	2nd-3rd pole (river side)
Mammoth Melt Sugar Pea	5/14	5th-6th " (" ")
Radish	5/27	sown in lettuce, in broccoli bed
Bloomsdale Spinach	5/15	1 bed
Blue Hubbard Squash (BH)	5/12	2 peat pots
Benning's Green Tint Squash (BGT)	5/12	6 peat pots
Green Hokkaido (GH) Squash	5/12	2 peat pots
All summer squash planted out 5/27		
Black Zucchini (Johnny's) (BZ)	5/12	6 small peat pots
Yellow Crookneck (YC)	5/12	9 small peat pots
More summer squash seeded in garden	5/27	1 small bed

SPRING TERM - Single Term Courses
SCIENCES

FIELD ORNITHOLOGY

This course included weekly field trips to ponds, fields, streams, and mountains to learn about the birds of Vermont. Some instruction was given in birdbanding and birdsong recording; students were free to follow these lines as a major part of their work for the course.

Excerpts from Teacher Interview

Again, we spend a lot of time in class which amounts to seven hours a week, and we're outside. That takes place when people aren't up; it's a beautiful time of day.

Colors, songs, behavior patterns are fascinating. I'm seeing something new, and I'm in love with the field of ornithology. So when I'm seeing something new that turns me on, they do too (this also happens in "Wild Plants"). There's an excellent book: Watching Birds. It's perfect for what I'm looking for. It's a beginning ornithology book. A lot of texts get hung up on names, and it's boring. This is geared to a good level for students.

Of the seven hours, six are in the field, and there they do projects - at first directed by me, then self-chosen. Some

Excerpts from Teacher Interview, continued

are on barn swallows, bird songs, studying an area behind one of the houses, starlings nesting in the science building. We've also been bird banding. It's a tough course - hard to get students past the frustration point. I hope I can continue to turn them on.

We stalked a bird around its territory twice; the class never got a good look. On our way back we scared a ruffled grouse. She went one way, the chicks another - she made noise. Things like that - there's always something there, if they keep looking.

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A Selected Bibliography

John Bull and John Farrand. The Audubon Society Field Guide to North American Birds. New York: Alfred A. Knopf, 1977.

Harrison, Hal H. A Field Guide to the Birds' Nests. New York: Houghton-Mifflin, 1975.

Pasquier, Roger F. Watching Birds: An Introduction to Ornithology. New York: Houghton-Mifflin, 1977.

Peterson, Roger Tory. A Field Guide to the Birds. New York: Houghton-Mifflin, 1947.

Pettingill, Olin Sewall, Jr. Ornithology in Laboratory and Field. Minneapolis, Minnesota: Burgess Publishing Co., Inc., 1970.

Robbins, Chandler, et al. Birds of North America: A Guide to Field Identification. New York: Golden Books, Western Publishing, Inc., 1966.

Welty, Joel Carl. The Life of Birds. Philadelphia, Pennsylvania: W.B. Saunders, Co., 1969.

WATERSHED ECOLOGY

This course was an advanced ecological study of soil and water as one organic system. The physical and chemical properties of water and soil were investigated, as well as their interactions in such related processes as erosion, flooding pollution, land management, forestry, and natural habitats on ecological, biological, and social/political levels.

Excerpts from Teacher Interview

I started with two students, and I've lost half the class. It's been a good course for me; I put a lot together in my own head as far as relationships go. One thing that's stuck about the whole thing is the comparison between the efficiency of water draining to that of the human body. The efficiency is very similar to the transportation system within the human body. We touched on issues of pollution, hydrogen cycle, thermal pollution, and waste/water management.

We did a lot - we studied the water that travels within the school grounds and began to amass our own information - it's just a beginning.

A Selected Bibliography

Primary Texts:

Flanagan, Dennis, et al., Editors. The Biosphere. San Francisco: W.H. Freeman, 1974.

Leopold, Luna B. Water: A Primer. San Francisco: W.H. Freeman, 1974.

Phillipson, John. Ecological Energetics. London: Edward Arnold, Publishers, Ltd., 1971.

Secondary Texts:

Andrews, William, Editor. A Guide to the Study of Freshwater Ecology. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972.

Andrews, William, Editor. A Guide to the Study of Soil Ecology. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1972.

Farb, Peter. Living Earth. Moonachie, New Jersey: Pyramid Publications, 1959.

James G. Needham and Paul R. Needham. A Guide to the Study of Fresh-Water Biology. San Francisco: Holden-Day, Inc., 1962.

Reid, George K. Pond Life. New York: Golden Books, Inc., Western Publishing Co., 1967.

A Selected Bibliography, Secondary Texts, continued

Research Department. LaMotte Soil Handbook. LaMotte Chemical Products Co., 1973.

Schaller, Frederick. Soil Animals. Ann Arbor, Michigan: The University of Michigan Press, 1968.

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WILD PLANTS

This was a taxonomic and ecological field course studying the flora found in our region. Field trips were made to various habitats in the local area to investigate what trees, ferns, and wildflowers are found, and why. Various "tools of the trade" were studied so that future identification could be made anywhere. Among subjects discussed were wild edibles, natural dyes, natural medicines, and plant/animal relationships.

Excerpts from Teacher Interview

It's a great course. It's the way I can set it up; it allows an individual development of awareness of the environment - as well as its "interconnectedness" and intricacies. The students have an incredibly increased awareness of what's going on around them. We visited habitats, a bog, a spruce forest; we walked next to a river. We were looking for dividing trees, then flowers, ferns, horsetail, and club mosses. Now we go back to look at all of them. Each time there are more connections to be made. To identify wild plants you have to be aware of a whole other world. We look at a lot of

Excerpts from Teacher Interview, continued

things. To get anywhere, they have to look, see, smell, feel, and make connections. Why are the black locust tree and clover in the same family? It's also a course geared for sharing. The more sharing, the more a class increases its energy. Now we're at a point of doing natural dyeing, medicinal herbs, edible wild plants. One person is doing a study of honey bees and how they relate to plants.

A Selected Bibliography

Cobb, Boughton. A Field Guide to the Ferns. New York: Peterson Field Guide Series, Houghton Mifflin, 1972.

Merle C. Coulter and Howard J. Dittmer. The Story of the Plant Kingdom. Chicago and London: University of Chicago Press, 1964.

Ketchledge, Edwin H. Plant Collecting. Syracuse, New York: State University of New York, College of Environmental Science and Forestry, n.d.

Roger Tory Peterson and Margaret McKenny. A Field Guide to the Wildflowers. New York: Peterson Field Guide Series, Houghton Mifflin, 1972.

Petrides, George A. A Field Guide to Trees and Shrubs. New York: Peterson Field Guide Series, Houghton Mifflin, 1972.

Seymour, Frank Conkling. The Flora of Vermont. Burlington, Vermont: University of Vermont, 1969.

Symonds, George W.D. The Tree Identification Book. New York: M. Barrows & Co., 1958.

SPRING TERM - Single Term Courses
HUMANITIES

A HISTORY OF VERMONT

This course was a survey study of Vermont from pre-history to the twentieth century. It dealt with land development and use, political and cultural tradition, agriculture, arts and tourism.

Excerpts from Teacher Interview

A good deal of Vermont history is dictated by its geography. For a short time, it was the only available wilderness for development prior to the American Revolution. Vermont, by virtue of its harsh climate and difficult topography, had not been developed like Connecticut, Massachusetts, or the Hudson Valley. The opening of the West and the entire expansion of the 19th century made available a vastly larger area of wilderness that was also good farmland. The decline in Vermont's economics was largely dictated by that.

Limitations on the development of industry were largely dictated by topography. The placement of areas of development in the state tended toward the valleys, being concentrated particularly on the confluence of rivers. Also, the social systems have to a large extent been dictated by the environment and the nature of settlement within the state. Small agricultural

Excerpts from Teacher Interview, continued

communities govern themselves differently than large industrial cities.

A good deal of the political and social development of the state was dictated by the economy, which in turn was dictated by the environment. The Irish tended to come with the development of railroads, which tended to follow the river valleys. The Italian and Welsh followed the quarries and stone cutting. The demographic nature of the state was dictated by available resources. We also dealt with the over-cutting of timber, the depletion of the deer herd, and the over-grazing of sheep.

A Selected Bibliography

Van De Water, Frederick. The Reluctant Republic. Taftsville, Vermont: Countryman Press, 1974.

In addition:
Each student did three book reports relating to the history of Vermont. Each student used different books according to his/her topic.

CARPENTRY

This course involved the design and construction of buildings. Students learned about design codes, blueprints, tools, and techniques used in constructing floors, walls, and roofs. Enrollment was limited to six.

Excerpts from Teacher Interviews

Fall

The idea is to have experience in the skills that are involved in building a house. We might do certain parts of that process; like now what we've done is work with floors. The students built a floor - a small one, but a floor - in the log cabin. They learned to use carpentry tools, and to use an electric saw.

In addition, we are looking at where materials come from. For example, traditionally decks are built out of redwood. We are asking where that wood comes from, how long those trees have lived to get that far, and if we want to use it or to work with something else that is not so endangered. It's a lot of extra work, but I think it's important.

Excerpts from Teacher Interviews, Fall, continued

This teacher also commented on what work relationships he felt were important.

What I'd like to do is to try to develop a partnership mentality, as opposed to a worker mentality. The kids should have the feeling that they can be involved in the building. In a worker mentality, you only do what you're told. A partnership is a relationship, and it develops a sense of richness in the kids about building.

Winter

We started the Music Room, but didn't finish it. We worked on building walls, and on how to do the wiring. We did successfully build a new stairway to that area. One student designed the stairs, doing the layout and drafting. I had all good workers. We divided into smaller groups of 2 and worked on different areas of the loft. When they all needed me at the same time, it was difficult.

It's the course that I want to change the most. I have to figure out how to do it cheaply or freely, or get more money for it. The kids are really interested, but we may have to drop it because of money.

Excerpts from Teacher Interview, continued

Spring

It just didn't go the way we wanted it to. We were going to build a house, section by section. A lot of kids signed up. We started really well, and then found out that we couldn't build the house. The kids were really disappointed. We continued the music room. I tried to encourage them to see that they were doing something even though it was not a house. Some did excellent work, and I think we'll finish by the end of the year. I even got some kids to slow down, take apart mistakes, and finish them correctly.

A Selected Bibliography

Stewart Elliot and Eugenia Wallis. The Timber Framing Book. Housesmiths Press, 1977.

Evelyn Loveday and Douglas Merrilees. Pole Building Construction. Charlotte, Virginia: Garden Way, 1975.

"Sunset" editors. How to Build Decks. Menlo Park, California: Lane Publishing Co., 1977.

Wagner, Willis. Modern Carpentry. South Holland, Illinois: Goodheart-Willcox Co., Inc., 1973.

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SHEEP TO SHAWL

Sheep to Shawl was described as an active, first-hand course in sheep farming. Students bought, raised, fed, and sheared sheep. They were then involved in spinning, dyeing, weaving, and wearing the wool products.

Excerpts from Teacher Interviews

Fall

The course will be different each term because the care of sheep has seasonal requirements. This fall, I waited until the students arrived because I wanted them involved in everything right from the beginning. The first thing we did was put up the fencing, after exploring what kind of fencing was appropriate for sheep. Then we took a field trip to a farm in northern Vermont where we picked out our animals and learned how to transport them. Once the sheep were here, we began to learn what was involved in their physical care. We examined them for their general physical condition. We learned about breeding; we wormed them, checked them for ticks, checked them for foot rot and pregnancy. Everybody has chores to do.

Excerpts from Teacher Interviews, Fall, continued

We feed and water the sheep, clean the barn, three times a week.

Because of the grant, we were able to purchase a spinning wheel from New Zealand. We've learned to mordant the wool with sulphate and cream of tartar and to prepare vegetable dyes. Students have projects. For example, one is studying a new breed of Finnish sheep; another is doing parasites which can be a serious problem with sheep. Basically, students have three responsibilities: their chores, researching and presenting a project or paper, and spinning, which is done in addition to class time.

Winter

It's the biggest change. The first term was getting started; we were all learning together. I was doing each step with the kids. During the winter, the barn work was done so we did more book work. I established a library. We went back historically and did a genealogy of sheep. We looked at how sheep and wool affected the United States and the economy, and at how Merino sheep landed in Vermont. We talked about how to buy sheep, where to get them. We went around the area and looked at different sheep and compared them. We also looked at different farming

Excerpts from Teacher Interviews, Winter, continued

set-ups and compared them. I got a lot of literature and photographs from different breeding associations so we could study the problems of breeding. We studied how to prepare for breeding, how to set up records and do charts. Then we did a chart for the lamb that was born.

At the same time we were doing that, we were also vegetable dyeing. Everyone in the class was putting in an extra hour. One student did 50 skeins of yarn - some single, some double. She did an onion skin dye, saffron, tumeric, coffee, tea - about 12 or 15 dyes altogether. We went from dyeing to a study of marketing. We talked about how to make a living as a weaver and the kinds of questions that raises about how you do your work - like do you use vegetable or commercial dyes?

Spring

The subject matter changes seasonally. We did mainly lambing and shearing. We moved the pasture, the barn; we wormed. In between, we learned to spin, and now we're in the final stages of mordanting and dyeing. We went to two sheep-shearing festivals: one in New Boston, New Hampshire, and the

Excerpts from Teacher Interviews, Spring, continued

other in Burklyn, Vermont. We met a lot of people, and I made new contacts. Marketing is coming into the picture a lot because we're selling our three ram lambs. We have to consider price, weight, color. At the fairs we looked at hand spun wool prices and talked about the value of it and whether it was relevant to do it. We talked about how weaving collectives work and why they collapse.

A Selected Bibliography

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Brooklyn Botanical Gardens. Dye Plants and Dyeing. Brooklyn Botanical Gardens, n.d.

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Svimicki, Eunice. Spinning and Dyeing. Scottsdale, Arizona: Golden Press, Western Publishing Co., 1974.

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A Selected Bibliography, continued

Reference Periodicals:

Shuttle, Spindle, and Dyepot

Sheep Canada Magazine

Shepherd

Black Sheep Newsletter

Fiber Arts

Farmer's Bulletins, Department of Agriculture:

Foot Rot of Sheep

Common Liver Fluke in Sheep

Docking, Castrating, Ear Tagging

Livestock Guarding Dogs

(NE) Production and Marketing of Sheep

Example of a Final Exam

Fill in the blanks, please.

1. Sheep were first domesticated in the _____ age and were used primarily for _____ and not for their wool or meat.
2. Other pastoral peoples used sheep for _____, _____, _____, _____, and _____.
3. There are more than _____ breeds of sheep.
4. The two ancestors of domestic sheep are the _____ and the _____ _____.
5. Fabrics of wool were found in the ruins of _____ _____ villages _____ years ago.
6. The Merino sheep was developed in _____.
7. The _____ _____ served as a great impetus to the sheep industry of England, because laborers were reduced and landlords were forced to turn their land holdings into pasture.
8. _____ brought the Merino to Mexico.
9. In the mid _____ there was a wool mill in Watertown, Mass.
10. _____ invasion of Spain broke the jealous guardianship of the Merino.
11. _____ and _____ were responsible in getting the Merino to the U.S.
12. In 1811 Merino wool sold for 75¢ a pound and in 1813 it sold for _____ per pound.
13. The _____ is an excellent meat sheep and not so good for wool (i.e., short staple fleece).
14. You can tell the sheep's age by its _____.
15. The word used to tell when a sheep is in heat is _____.

Answer briefly, please.

1. What does coll mean?
2. What is pinning?
3. What is bloat?
4. What is scours?
5. How can you help prevent tick infestation in your flock?
6. Why is the Finnsheep a good breed and why not?
7. Explain why one might breed a Finnsheep with a Hampshire sheep.
8. Explain how many sheep you can put on an acre and what conditions for pasture are best.
9. What is pasture rotation?

Example of a Final Exam, continued

10. What does Wire # 1046 mean?
11. When do you put the ram and ewes together for mating?

Essays
1. Explain the duties of a good shepherd prior to lambing.
2. Explain what to do after a healthy lamb is born.
3. What to do in a very difficult delivery when no vet is available.
4. What is vaginal prolapse and how do you treat it?
5. What did you like best about this course and why and how could it improve? How could I improve as an enabler to your learning?

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STRUCTURES

This course started with the idea of completing a log cabin by the end of the school year. The course covered cabin design, foundation building, log cutting and woodlot management. Students acquired basic skills in tool use and problem solving.

Excerpts from Teacher Interviews

Fall

Let me start from the beginning, which was last fall. The idea was to build a log cabin. I had never done anything like this before, although I had read books and gone to my cousin's, who lives in British Columbia and builds log houses for a living. There I learned a great deal in two weeks.

What we started to do last fall was to cut down trees which are on the land here. It was part of the course because I really wanted people to be able to use local natural resources, ones that were maneuverable to the greatest extent possible. We've done it all by hand (except for a little bit of power from a chainsaw), which was another purpose of the course.

Excerpts from Teacher Interviews, Fall, continued

This helps people become more self-reliant, become more familiar with tools, and familiar with the use of their hands and tools.

Then we designed the house, taking into consideration the environment. Site analysis was certainly a big part of the design process. We designed it to take as much advantage of our spot as possible.

It's facing directly south. There will be no windows on the north. There is a tree line on the north side to block the north wind. It has a beautiful view, which is definitely a part of the house. The overhang of the roof is designed to take full advantage of the winter sun, and to block the summer sun. That's on the south side. On the north side, where there are no windows, the overhang is such that we can have a wood pile.

We continued - dug our foundation hole last fall, and all winter we cut trees, cut them and limbed them. In the spring, we built our foundation piers, poured them with cement, and had the logs pulled out by horse. Then we started building. We put up our logs last spring and then this fall, again, we just started. We made floor joists, hewed the logs for the floor joist, and started putting logs up. We also built the sub-floor.

Excerpts from Teacher Interviews, continued

Winter

It was a tough course in the winter weather. With the snow build-up, we worked hard, but didn't get as far - had to shovel three to four feet of snow off the logs. We ran into different problems - and that's the intention. It's all about problem solving and using tools available to everyone, and not specialized. I suppose it was difficult to picture the whole cabin because of the snow; you couldn't see it. We got a few windows done and did log work. We got a lot done in terms of what we could do.

Spring

The first half went great; we did a lot. Everyone was enthusiastic and worked hard as individuals and as a class. After mid-term, we haven't done nearly as much. But it's a beautiful cabin - the prettiest cabin I've ever seen. We're putting joists on for the loft, so we've got most of the walls done. We're going to work week-ends, and with good weather, we could do the walls this term. The roofing and finishing would be left.

A Selected Bibliography

Leitch, William. Hand Hewn. San Francisco: Chronicle Books, 1976.

Makie, Ethan B. Building With Logs. Prince George, British Columbia: Ethan B. Makie, 1976.

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WOODWORKING

This course involved working with tools, wood, and one's hands in a workshop-studio. In this course, these factors were combined so that tables, looms, musical instruments, shelves, and snowshoes became projects which the students could undertake with confidence. No previous experience was required.

Excerpts from Teacher Interviews

Fall

Woodworking is an indoor activity, as opposed to carpentry which is an outdoor activity. We looked at where materials had come from and developed ideas as to how to use those materials. I don't encourage kids to take plans and copy them, but to use other people's work or books for inspiration. I want them to relate what they want to make to the room in which it is to be used. I want them to experience the whole planning process. The measurements in a book are someone else's; what do you want? What do you need? Where do the things come from? Can you build it so that you can take it with you?

We took a field trip to a hardwood distributor, probably the biggest distributor in Vermont. The kids saw things they

Excerpts from Teacher Interviews, Fall, continued

had never seen before; they had the experience of seeing all different kinds of wood. They asked why some woods were more expensive. The idea that the price could be raised because some people think it's beautiful really interested them. So did the whole supply and demand thing as well as the endangered species of wood. Someone bought a piece of African wood - someone else, a piece of ebony. They liked the idea that these things came from somewhere else. It was like relating to other parts of the world through wood.

Winter

More kids signed up than I could take. I took that as an indication to develop the program further. We worked with a lot of weather-related obstacles. For example, we couldn't get the right kind of wood. Or we couldn't get it cut. We had a lot of trouble making snowshoes. But the kids did fine; we had quite a few successes. The floor looms worked out very well; we built rocking chairs and a bookcase. One student who had begun without much confidence ended up making a table and stool. She accepted the problems and did a nice job.

Excerpts from Teacher Interviews, Winter, continued

This teacher began rethinking ways of presenting projects. He felt that easier, shorter-term projects might be encouraging to new students, projects that could be completed in three weeks instead of ten weeks. At times he said that it would also be useful to students to offer a particular course of instruction in, for example, building a rocking chair, where he could set up a procedural system where he could show them how to set jigs and saws, etc.

Spring

Most of the kids were beginners, and all were good workers. I've become more conscious of time and pushed them along toward a ten-week completion of their projects. I think it was very helpful to them. The shop has gotten a lot of use. We're trying to have a display ready by the end of next week. I've also started a portfolio of photographs of students' work.

Some spring projects were: a coat rack on a pedestal with three dove-tailed legs, a mirror, a backgammon board, a rocking chair, a teak cradle, a clock and barometer, turned plates and bowls (on the lathe), and a solid body guitar.

The teacher discussed restructuring this course for next

Excerpts from Teacher Interviews, Spring, continued

year into beginning, intermediate, and advanced stages. He planned to begin each section with a project of his choosing where he would provide a more structured instruction in the use of the workshop. Then students would finish the term with a project of their own choosing.

A Selected Bibliography

Campbell, Robert. How to Work With Tools and Wood. New York: Pocket Books, 1977.

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Ragnar Gustavson and Ollie Olson. Creating in Wood With the Lathe. New York: Van Nostrand Reinhold Co., 1968.

Handberg, Ejner. Shop Drawings of Shaker Furniture. Stockbridge, Massachusetts: Berkshire Travel Press, 1973.

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Hines, Chet. How to Make and Play a Dulcimer. Harrisburg, Pennsylvania: Stackpole Books, 1973.

Jeri Hjert and Paul von Rosenstiel. Loom Construction. New York: Van Nostrand Reinhold Co., 1978.

Krenov, James. A Cabinetmaker's Notebook. New York: Van Nostrand Reinhold Co., 1976.

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A Selected Bibliography, continued

Moser, Thomas. How to Build Shaker Furniture. New York, London: Drake Publishers, Inc., 1977.

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Nish, Dale. Creative Turning. Provo, Utah: Brigham Young University Press, 1975.

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Robinson, Trevor. The Amateur Wind Instrument Maker. Amherst, Massachusetts: The University of Massachusetts Press, 1973.

Schutze, Rolf. Making Modern Danish Furniture. New York: Van Nostrand Reinhold Co., 1973.

Seike, Kiyoshi. The Art of Japanese Joinery. New York, Tokyo: Weatherhill Press, 1977.

Shea, John G. The American Shakers and Their Furniture. New York: Van Nostrand Reinhold Co., 1971.

Shea, John G. Antique Country Furniture of North America. New York: Van Nostrand Reinhold Co., 1971.

"Sunset" editors. Furniture You Can Make. Menlo Park, California: Lane Publishing Co., 1974.

Watson, Aldren. Country Furniture. New York: Thomas Crowell Co., 1974.

"Woodcraft Supply Catalog", Woodcraft Co., Woburn, Massachusetts.

FULL YEAR COURSES
SCIENCES

EASTERN MIND, WESTERN SCIENCE

Eastern Mind, Western Science was a three term sequential course. The course sequence was designed to question and broaden our concepts of self and world by examining the parallels emerging between contemporary scientific thought and eastern philosophy. The course was an outgrowth of the relativity, cosmology, and astronomy courses of the previous year and remained heavily grounded in the physical sciences by using texts dealing with scientific topics which had been raised in those previous courses. Perspectives on eastern thought were presented through readings and through the teacher's extensive personal knowledge.

Excerpts from Teacher Interviews

Winter

What I did was to follow a class suggestion that came from the fall end-of-term evaluation. In the fall, I had made a great effort to discuss science and eastern mind simultaneously and draw parallels. I thought that that was a viable expectation. I didn't count on the lack of science background. They had difficulty with science concepts. So this term we spent six

Excerpts from Teacher Interviews, Winter, continued

weeks on science. It became a science course and the last four weeks were on Eastern thought. There was more satisfaction; things were dealt with more thoroughly.

Spring

It's going pretty well. We're behind schedule, so we won't get involved in Kuhn's book. We did finish the section on straight eastern thought by finishing Cutting Through Spiritual Materialism.

It went incredibly well. I was amazed at the level of sophistication of class discussions. Now we're finishing the Tao of Physics (noting the parallels). That's also going quite well. That will be the end. I've been giving regular tests.

This course came out of a mixture of my own interests and the intents of the Life Systems Program: interrelatedness of all subject matter, talk about parallels of thought between two distinctly different schools of thought.

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A Selected Bibliography

Fall, Primary Text:

Capra, Fritzof. The Tao of Physics. Des Plaines, Illinois: Bantam Books, Inc., 1977.

Fall, Secondary Text:

Suzuki, Shunryu. Zen Mind, Beginner's Mind. Rutland, Vermont: John Weatherhill, Inc., 1970.

Winter:

Asimov, Isaac. The Collapsing Universe. New York: Pocket Books, Inc., Simon & Schuster, 1978.

Trungpa, Chogyam. Cutting Through Spiritual Materialism. New York: Shambhala Publications, Inc., Random House, Inc., n.d.

Spring (planned but not used):

Kuhn, Thomas. The Nature of Scientific Revolutions. Chicago: University of Chicago Press, 1970.

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Example of Course Objectives

In this course we will strive to learn specifically:

1. The non-mathematical fundamentals of Quantum Mechanics and Einstein's special and general theories of relativity.
2. The philosophic implications of relativity and Quantum Mechanics.
3. The atmosphere and personalities behind the relativity-Quantum Mechanics revolution.
4. Theories relating to the origin and evolution of stars, planetary systems, galaxies, and the universe.
5. Fundamental principles of astronomy.
6. Theories dealing with quasars, pulsars, black holes, and other astronomical phenomena.
7. The fundamentals of the eastern approach to existence.
8. The parallels between modern scientific thought and eastern thought.

Concurrently we will grapple with the nearly hopeless questions:

1. What is the universe?
2. Who are we?
3. How is tea served properly?

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Sample Essay Test Question, Fall

What is your understanding of Quantum Theory and what does it have to say about the nature of reality?

Sample Test, Fall

1. What is the philosophical basis of classical physics?
2. What is the philosophical basis of the new physics?
3. What are the implications of the speed of light being the same for all observers?
4. What parallels can you draw between the new physics and eastern thought?
   A. Have you been doing the assigned work?
   B. Have you been using the class to your advantage?
   C. Who are you? What is the universe?

Sample Questions for Self-Evaluation, Fall

What are you getting out of this class personally?
Evaluation of your level of effort, preparation, interests, comprehension, and why.
Analysis of the course structures, materials, suggestions for improvement.
What grade do you think you should have?

Sample Test (II), Winter

1. Chandrasekhar's Limit is 1.4 times the mass of the sun. What happens to stellar remnants below that value? What happens to remnants slightly above that value? (10 points)

Sample Test (II), Winter, continued

2. How massive must a stellar remnant be before it can collapse into a black hole? (5 points)
3. What is a pulsar? Why are pulsars called pulsars? (That is, where did the name come from?) (10 points)
4. What opposes the inward crush of gravity in a neutron star? (5 points)
5. Why do tidal forces tend to pull things apart? (10 points)
6. If a star collapses and becomes a neutron star, the over-all strength of the gravitational field may not change significantly, yet the tidal effects become vastly greater. Explain why this is so. (10 points)
7. What is an event horizon? (8 points)
8. If black holes are black, how are they detected? (10 points)
9. In a black hole, what opposes the inward crush of gravity? (5 points)
10. What are mini black holes? How were they created? (assuming they do exist) What happens to them eventually? (12 points)
11. Why are quasars called quasars? What is so mysterious about them at the present time? (10 points)
12. Quasars may be white holes. If matter fell into a black hole now and came out a quasar 3 billion light years away, when would it come out? (5 points)
13. This is not a test question. It is merely a sneaky way to remind you that the assignment for Monday is to read the first 28 pages of Cutting Through Spiritual Materialism.

Sample Test, Midterm, Winter

Note: Answers should be no more than a few words or a few sentences in length.

1. List, in order of decreasing strength, the three main forces operating in the universe.
2. Could the surface gravity of a star ever change while the overall strength of the star's gravitational field remained constant? What would have to happen in order for this to occur?

Sample Test, Midterm, Winter, continued

3. In a planet, what is the nature of the force which stops the inward pull of gravity?
4. Both gravitational and electromagnetic forces decrease in strength at the same rate (with the square of the distance), so how come among the stars and planets only gravity operates at large distances?
5. Why does the earth have very little hydrogen in its atmosphere?
6. What is the essential difference between a star and a very large planet such as Jupiter?
7. What is degenerate matter?
8. How does the sun produce its energy?
9. How can planets be detected around stars other than the sun?
10. What is a red giant? That is, what causes a red giant to be the way it is?
11. Are red giants related in any way to the Jolly Green Giant?
12. What is a white dwarf? What force in a white dwarf opposes the inward pull of gravity?
13. It is said that other galaxies are flying away from us. How has this been determined?
14. Star A is very massive. Star B is not very massive. Which one burns hottest? Which one lives longest?
15. What is the final stage of most stars?
16. How do some stars for planetary nebulae?
17. What is the current theory on how novas happen?
18. What is the current theory on how supernovas happen?
19. Which occurs more frequently, novas or supernovas?
20. Is it true that the supernova is just a souped-up version of the Chevy Nova introduced by General Motors in the 1960's?

Sample Test (III), Winter

The essential question of this test is: "What does it mean to be on a spiritual path?" Please answer this by answering the specific questions below.

Sample Test (III), Winter, continued

1. What motivates a person to look for a spiritual path and then walk upon one?
2. One of the main pitfalls of any spiritual path is spiritual materialism. What is spiritual materialism?
3. It is fair to say that enlightenment is nothing more than just seeing things clearly. What is the myth, illusion, or mistake which prevents us from seeing clearly?
4. What is the role of a spiritual friend? How necessary is such a person and why?
5. Although nobody "gets" anything by walking a spiritual path, the process does produce "openness". What is meant by openness in this context?
6. A sense of humor also develops from walking a spiritual path. What is humor in this context? Should you walk a spiritual path so that you will be able to tell jokes better?

PHYSICS: ENERGY

This was a three-term sequential course which focused on energy. The fall term, subtitled "Conventional Energy", was concerned with developing a working understanding of this country's present energy uses and methods of production. The first three weeks were an intensive introduction to the concepts of physics and mathematics required to understand energy use and production. The remaining seven weeks were devoted to discussion of the major sectors of energy use - residential, commercial, industrial, and transportational - and of the conventional forms of production: hydro-electric, fossil-fuel, and nuclear. The discussions of energy uses centered around the total amount of energy consumed in each sector, and ways in which these amounts can be reduced by cost effective methods; the discussions of energy production centered on the cost effectiveness of each form, its impact on the environment, and/or the social and political implications of fuel import and export. Field trips included visits to a hydroelectric plant, an oil fired gas turbine generator in Ascutney, Vermont, and an independent Light & Electric Generating Station, which burns wood chips, coal, oil, and natural gas.

The winter term in Alternate Energy extended the discussions of methods of energy production which are not now in significant commercial use: wind, solar, geothermal, fusion, methane,

Course Description, continued

alcohol, etc. These alternate forms of energy were compared to conventional forms in terms of cost efficiency, engineering and distribution problems, and environmental, social, and political impact. Discussions also weighed the advantages and disadvantages of small group or individual alternate energy projects, such as solar platforms in space and massive solar arrays.

The spring term, Alternate Energy Project, was to be the actual construction of an on-campus alternate energy source, such as a wind generator or a solar hot water heater. The selection of the device began in the Alternate Energy course and plans were finalized early in this course. It was hoped that the project would yield a device which would fulfill an actual energy demand of the school, would be compatible with the rest of the school's conventional-energy supply system, and would, in the long run, be cost effective.

Excerpts from Teacher Interviews

Winter

In terms of mechanics, Alternate Energy went best of all... they were good students and they picked it up fast. My disa-

Excerpts from Teacher Interviews, Winter, continued

ppointment was in the lack of field trips. It was hard to get the organization, a downfall everytime. Weather often made them impossible.

I had thought to spend a great deal of time on alternate energy, but we only spent five weeks out of ten on solar, wind, etc. A lot of time was spent on nuclear power, which I don't consider to be an alternate. They had delightful technical information about nuclear energy and its effects - it not being true to its name, of course. They did a good job of comparing and contrasting.

In alternate energy we got into real questioning of existing forms and alternatives.

Spring

The teacher felt that the course was not going that well. They had begun the term with reading and class assignments and the students weren't that responsive.

So I sat down with the class and said, "O.K., what are we going to do?" We were two chapters into Dickson's Politics of

Excerpts from Teacher Interviews, Spring, continued

Alternative Technology and were working on a solar hot water heater. It was working, so we decided to drop the books and build the hot water heater. We're trying to make a pre-heater for Acorn 5 (small dorm). We've been scrounging materials, and we found an old 30 gallon inner tank, ran a pressure check to make sure it was useable. We found a larger 55 gallon drum to use as a heat transfer device. This week we're looking for copper and glass pipe. I doubt we'll finish by the end of the term, but we're cruising along again.

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A Selected Bibliography

Conventional Energy:

Romer, Robert. Energy: An Introduction to Physics. San Francisco: W.H. Freeman, 1976.

Schumacher, E.F. Small is Beautiful. New York: Harper & Row Publishers, Inc., 1976.

Periodicals, Examples:

"Speaking Out/Helen Caldicott". Reprinted by the Upper Valley Energy Coalition with permission of New Age Journal, Manchester, New Hampshire, December 1977.

Gail Daneker and Richard Grossman. Guide to Jobs and Energy, pamphlet. Washington, D.C. (Room 305, 1101 Vermont Ave., N.W.): Environmentalists for Full Employment, 1977.

Upper Valley Community Power. Lebanon, New Hampshire (18b Mascoma Street): Upper Valley Energy Coalition, n.d.

Alternate Energy:

Lovins, Amory, et al. The Energy Controversy: Soft Path Questions and Answers. San Francisco: Friends of the Earth, Inc., 1978.

Alternate Energy Project:

Dickson, David. Politics of Alternative Technology. New York: Universe Books, Inc., 1977.

Example of Course Objectives

In this course we will strive to learn specifically:

1. What energy is, and the units and methods of expressing it.
2. The type(s) of energy currently in use.
3. Where our energy is presently coming from.
4. The ways in which we use our present energy forms.
5. The limitations of our present energy resources.
6. An approximate time-line for the depletion of our resources.
7. The social, economic, and political implications of our present patterns of energy supply and use.
8. What alternative energy forms are available and at what cost.
9. What alternative ways there are for using energy.
10. The social, economic, and political implications of switching to alternative energy sources.
11. The interlocking relationships among social, economic, political and technical systems.
12. The means by which technological, social, economic, and political changes can be effected.
13. The role individuals and organizations can play in effecting meaningful changes in society.
14. How to plan, design, and construct a viable alternate energy device.

In general, we will strive to learn:

1. To stop transferring our personal power to "experts".
2. How meaningful change in the world can begin only within ourselves.
3. How to open ourselves to positive change.
4. The futility of trying to effect change through passion or aggression toward the issues or through ignoring them.
5. The rewards of undertaking a disciplined study.
6. How to direct our own education.
7. How to find joy and a sense of humor within ourselves, the world situation, and the process of our education.

Sample Test, Conventional Energy

1. Simplify the following:

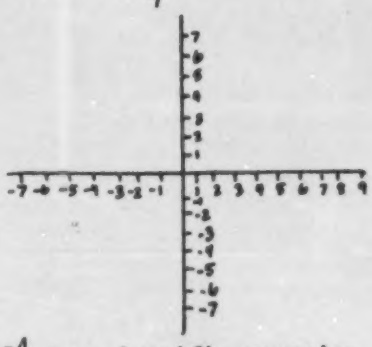
   a) $\frac{\frac{3}{4}}{5} = ?$ b) $\frac{\frac{4}{3}}{\frac{7}{2}} = ?$ c) $\frac{\frac{x}{m}}{\frac{m}{4}}$

2. $B = \frac{MT}{G}$ a) solve for M
   b) solve for G
   c) solve for T

3. $O = YA + N$ a) solve for Y
   b) solve for N

4. $BT^2 + G = X$ solve for T

5. $Y = 2X + 3$
   a) graph the equation →
   b) what is the slope?
   c) what is the Y intercept?



EXAMPLE FOR PROBLEM 6: .0041 is 4.1×10^{-4} in scientific notation
10700 is 1.07×10^{5} in scientific notation

6. Express in scientific notation
   a) 31600 b) .00175

7. Express as ordinary numbers
   a) 7.11×10^{5} b) 4.2×10^{-4}

8. Evaluate the following:
   a) $16 \times 10^{6} \times 2 \times 10^{4} = ?$ b) $\frac{12 \times 10^{7}}{3 \times 10^{4}} = ?$
   c) $\frac{15 \times 10^{9}}{5 \times 10^{-2}} = ?$ d) $(3 \times 10^{4})^{2} = ?$
   e) $\sqrt{9 \times 10^{6}} = ?$ f) $\sqrt{8.1 \times 10^{5}} = ?$

Sample Test (I), Conventional Energy

OPEN BOOKS! OPEN NOTES!

1. What is the K.E. of a Mac Truck (say 20 metric tons or 2×10^{4} Kg) moving at 55 mph? Please show your work in a logical, step-wise sequence, and carry all units through the calculation.

Sample Test (I), Conventional Energy, continued

2. Assuming no friction, how far uphill could the truck in problem #1 coast before coming to a stop? Again, stepwise work, with units, please.
3. A bullet from a deer rifle has a muzzle velocity of 3300 feet per second. If it was fired vertically and there was no air resistance, how high would it go? You are welcome to do this in either the English or the Metric system. Again, stepwise, with units.
4. If a person jumped off the Empire State Building (h = 1200 ft.), how fast would he or she be going upon impact? Neglect air resistance. English or metric. Stepwise, with units.
5. What thoughts do you have about the field trips we have taken so far? How can we better integrate them into the course? What other kinds of trips or activities would you like to see us do to help us understand how we are getting and using energy?
6. How do you feel you're doing in the course? Are you doing the work? Are you using the classtime to your best advantage? If not, describe how your personal situation or the class might be improved to help the problem.

Sample Test (Last), Conventional Energy

1. Western Mass. uses electrical energy at a rate of 1.5 x 10^9 w. If the Connecticut River has a flow rate of 6.0 x 10^4 Kg./sec., how high would a single dam on the river have to be to provide all the power for western Mass.? Is building such a dam a feasible idea?
2. Will reducing the size and increasing the efficiency of present gasoline-powered cars, and converting to electric, propane, or flywheel powered cars answer the current transportation dilemma? What is the essence of the transportation problem and what must be done about it?
3. A large house in Woodstock might have a thermal conductance of 45,000 BTU/D.D. If the cost of fuel oil is 50¢ a gallon, and the number of degree days in the year is 9,000, what is the annual heating cost of this house?

Sample Test (Last), Conventional Energy, continued

4. What is the theoretical efficiency of an internal combustion engine if the maximum temperature of the cooling water is 100^{o} c, and the outside temperature is 25^{o} c? If a pressurized cooling system is used and the maximum temperature is raised to 120^{o} c, what is the new efficiency? Is this a significant increase?
5. Here is an idea. Wind-generators are good sources of electrical energy, but the problem is the wind doesn't always blow. Why not use the energy generated to charge batteries when the wind is blowing but the electrical demand is low? The stored energy in the batteries could then be used to drive a large fan to create wind for the wind-generator so that it could generate when the natural wind wasn't blowing or could supplement the natural wind when the electrical energy demand was greater than that which could be produced by the natural wind. Analyze this idea in terms of the laws of thermodynamics.
6. It is said that a heat pump can provide 1.0 MBTU to a house but requires a total energy input of only 0.9 MBTU. Is this just a sales pitch by heat pump manufacturers? Doesn't it imply that "you're getting something for nothing" and thus violate the First Law of Thermodynamics? Explain.
7. In terms of entropy, what is wrong with electric heating?

Sample Test, Alternate Energy (I)

1. Fenway Park in Boston seats 33,000 people. What is the total cost and what is the cost per person of electricity for a night game if the Park is illuminated by 1120 bulbs of 1500 W each? Assume the lights are on for four hours and that the cost of electricity is 4¢ per Kw. Hour. Should this cost justify a higher ticket price for night games? Show your work step by step.
2. Is it possible to have a 5200 W clothes dryer, a 1200 W dishwasher, a 970 W toaster, and a 400 W blender all operating at the same time on one 15 amp circuit? Show what the actual current requirement is.

Sample Test, Alternate Energy (I), continued

3. A typical house clock uses about 2 W of power. What is its resistance?
4. At 3¢ per KWHr what will it cost to heat a 40,000 BTU/D.D. house for a (cold!) month in which there are 1300 D.D.?
5. A gas gauge on a car is really nothing more than a voltmeter. In the gas tank there is a variable resistor connected to a float. As the gas goes down and the float drops, the resistance changes in the circuit. If a meter-movement requires 10^{-3} amp for full-scale deflection, what size resistor should be put in series with the meter so that "full" on the gas gauge really means 12 volts?
6. A current can be induced only when there is relative motion between a magnetic field and a wire. For example, if a coil of wire is spun inside a magnetic field, a current is induced in the coil (this is the essence of a generator). In a transformer however, there are no moving parts. How can there be any current induced in the secondary windings?
7. You are an engineer charged with the job of transmitting 130 KV at 150 a to a city 60 miles away from a generating station. You are not allowed to lose more than 10 KV along the way. (That's 5 KV per wire, by the way!) What diameter wire should you use?

Sample Test, Alternate Energy

All the questions on this test are on one theme:
IS A SILICON SOLAR CELL POWERED ELECTRIC CAR FEASIBLE?

1. Assume a 2m by 5m car has its top surfaces entirely covered with solar cells. Assuming that the cells have an efficiency of 20% (good cells!) and that the solar flux at noon on a clear day is 1 KW/M^2, show how much power is available in comparison to the 9 KW needed to keep the car going at 40 mi/HR. Will the car be able to run at 40 mi/HR? Assume the car now has storage batteries aboard which can be charged by the solar cells. Also assume the car is to be used for 80 mi of travel a day at an average speed of 40 mi/HR. (20 pts.)

Sample Test, Alternate Energy, continued

2. What is the total energy needed by the car? (5 pts.)
3. If in the Boston area the average annual solar radiation is 150 W/M^2, will there be enough solar energy available to provide the total energy needed? (Note: the 150 W/M^2 figure is an average and is therefore available for 24 hours per day. Also please remember the 20% efficiency factor.) Compare the energy available to the energy needed. (25 pts.)
4. If additional energy is needed to run the car, assume it could be provided by solar cells on the roof of the home of the owner of the car. (Inside the house batteries would store the energy and would charge the cars at night). How much additional energy would be needed? (5 pts.)
5. How many square meters of additional solar cells (at 20% efficiency and 150 W/M^2) would be needed to provide this energy? What is the total area (house and car) of solar cells necessary to power the car? (25 pts.)
6. Solar cells now cost about \$10,000 per M^2. Assume that through mass production the cost is cut by a factor of 100. What is the purchase cost of the cells? (5 pts.)
7. Assume an \$800 installation fee for the cells on the house and a cost of \$4500 for the car without the cells. What is the total cost of the whole solar-car system? (5 pts.)
8. Assuming the solar car system is financed at 15% on a 10 year loan, what is the annual cost and what is the total cost? Is this a feasible idea for most people? What was the major cost assumption made in arriving at this figure? (10 pts.)

FULL YEAR COURSES
HUMANITIES

COLLOQUIUM ON STRATEGIC ARMS CONTROL

Whether or not strategic weapons can be effectively limited or reduced in number plays a large role in determining whether or not world political stability can be maintained. This course offered a colloquium format for those who were interested in pursuing various aspects of the arms control problem. A wide variety of topics and resource materials were available.

In winter and spring terms, this course continued the discussions of arms control and disarmament issues as they had been begun in the fall. While the study of issues and their causes continued, increasing emphasis was placed upon finding alternatives to the "gaming" approach to arms control and disarmament that is presently used by both of the superpowers. The role of the individual in affecting changes in national arms control and disarmament policy were examined and efforts were made to increase information-sharing and other forms of cooperation between this class and peace/action groups in the area.

Excerpts from Teacher Interviews

Fall

Excerpts from Teacher Interviews, Fall, continued

This course was undertaken as an expression of the view that teaching has to do with an abiding interest in learning, that it is a form of learning.

I'm offering a course about which I know absolutely nothing. It's literally a group independent study. This course is the one that has my interest at a peak.

Winter

The overall tone was excellent. There were five people and myself and their responsibility rotated. It's a colloquium format and I'm the principle agent.

I guess people were into it; they did the reading, there was good participation in discussion. Toward the end of the term, students were bringing in material from outside sources that I had missed.

I think the rewarding part is a sense that this was an opening of a whole new field of what is going on in the world - for me and for others in the class. It's the beginnings of a political awakening and not only limited to strategic arms. We were dealing with the world political situation. I felt really good about that.

Excerpts from Teacher Interviews, continued

Spring

We went to a disarmament conference, and we really learned a lot. In the afternoon we split up into different discussion groups. We came back and shared our notes, perceptions, etc. We began using literature from that conference. In last term's self-evaluation, we had wanted more material dealing with current events, and now we've done that. To continue with that meant we'd lose the historical perspective, so we picked up the book again.

A Selected Bibliography

Myrdal, Alva. The Game of Disarmament: How the U.S. and Russia Run the Arms Race. New York: Pantheon Books, 1977.

Yergin, D. Shattered Peace: Origins of the Cold War and the National Security State. New York: Macmillan Publishing Co., Inc.

Periodical Literature:

Philip Morrison and Paul Walker. "A New Strategy for Military Spending". Scientific American, October 1978, Vol. 239, No. 4.

Selected Current News Articles

Example of Course Objectives

This course seeks to answer the following questions:

1. How do we define arms control and disarmament?
   a) By what techniques has arms control been employed?
   b) By what means or methods has it been achieved?
2. What motivates nations to seek arms control accords - economic, security, or ideological factors?
3. What are reasonable objectives for arms control? Is parity essential? or possible?
4. What are the risks and dangers associated with entering into an arms control agreement?
   a) How realistic is it to negotiate with authoritarian governments?
   b) How essential are verification and control procedures? What kinds are best? or reasonable?
5. To what extent have past arms control agreements "worked"?
   a) What expectations should we have for the future?
   b) How is success or failure measured? Is simple duration adequate?

We will also strive to learn:

1. How arms control is interrelated with political, social, economic, and technological issues.
2. How effective arms control is in maintaining world stability.
3. What other measures are effective in maintaining world stability.
4. How individuals and organizations can make meaningful contributions to world peace.
5. What the next course should be in this open sequence.

WEAVING

Weaving was taught on an individual basis, and beginners as well as advanced students enrolled. For beginners it was an introductory course in the methods of setting up the loom, figuring out a pattern, and producing a complete assignment. More advanced students expanded on the basics, developing their own techniques and dyeing and spinning their own wool.

Excerpts from Teacher Interviews

Fall

Beginning is involved with learning the basics - some color and texture problems, but mostly the mechanics. A student has to take beginning weaving, unless they've had a course before. Some incredible things are happening in advanced weaving. One student is doing one of the finest tapestries I've ever seen. Both classes meet together and that way it becomes a real working and sharing workshop. I weave right along with the kids. I like to keep the class small so that we can have good relationships.

Excerpts from Teacher Interviews, continued

Winter

By the end of the winter term, the teacher noted that Sheep to Shawl was having a positive and unexpected impact on the weaving course. In addition, she was drawing on new research material such as slide packets from different weaving guilds which allowed students to see others' work, and work in detail, as well. Many more books were being used. Students kept journals, took photographs, and became involved in color problems and comparisons for natural dyeing. Sheep to Shawl offered a broader perspective for students.

Spring

The quality of student work continued to improve. The teacher found that by taking slides of students' work and showing it to the incoming class, the students were able to concretely see what others could do, and it broadened their expectations of their own work. Students who had taken both Sheep to Shawl and Weaving were producing work that used more fleece or hand spun yarn than did other students.

A Selected Bibliography

Adrosko, Rita J. Natural Dyes and Home Dyeing. New York: Dover Publishing, Inc., 1971.

Brooklyn Botanical Gardens. Dye Plants and Dyeing. Brooklyn Botanical Gardens, n.d.

Brooklyn Botanical Gardens. Natural Plant Dyeing. Brooklyn Botanical Gardens, n.d.

Bradbury, Margaret. The Shepherd's Guidebook: Raising Sheep for Meat, Wool, and Hides. Emmaus, Pennsylvania: Rodale Press, Inc., 1977.

Ensminger, M.E. Sheep and Wool Science. Danville, Illinois: Interstate, 1970.

Simmons, Paula. Raising Sheep the Modern Way. Charlotte, Vermont: Garden Way Publications, 1976.

Svimicki, Eunice. Spinning and Dyeing. Scottsdale, Arizona: Golden Press, Western Publishing Co., 1974.

West, W.C. Anyone Can Build a Spinning Wheel. Santa Rosa, California: Thresh Publications, 1975.

Wilson, Jean. Weaving You Can Wear. New York: Van Nostrand Reinhold Co., 1973.

A Selected Bibliography, continued

Reference Periodicals:

Shuttle, Spindle, and Dyepot

Sheep Canada Magazine

Shepherd

Black Sheep Newsletter

Fiber Arts

Farmer's Bulletins, Department of Agriculture:

Foot Rot of Sheep

Common Liver Fluke in Sheep

Docking, Castrating, Ear Tagging

Livestock Guarding Dogs

(NE) Production and Marketing of Sheep

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THE SUMMER PROGRAM

The Summer Term is described in this separate appendix because it was run as a pilot program for a four-term year, and was not documented in the same fashion as the Fall, Winter and Spring Terms. The information in this section was provided by the faculty, but does not include tests or detailed examples of class projects nor interviews with students or faculty.

ALTERNATE ENERGY

This course was designed as an exploration of the technological and social aspects of alternative energy sources and energy. The course examined the problems of contemporary energy sources and the promise and problems of various alternative sources: nuclear, solar, etc. Students were involved in classwork and practical hands-on activities.

Excerpts from Teacher Comments

Recognizing that the main obstacle to the implementation of alternative energies is political rather than technical, the first three weeks of the course were spent discussing the social implications of energy policy. This included discussions of the locus of decision-making, the relationship of economic and political power, the economic consequences of a steady-state economy, and the conflict between the historical trend toward centralization and the future advantages of decentralization.

It was immediately apparent to me that the students' main interest was in the nuclear issue. Their first paper assignment was a detailed analysis of nuclear power. Topics covered were:

Teacher Comments, continued

descriptions of nuclear accidents, waste disposal, and plant decommissioning, low-level emissions, nuclear proliferation, nuclear physics, and plant design.

Weeks 4 and 5 were spent dealing with passive solar and its applications for housing and food drying. Also covered were semi-active hot water systems.

Week 6 was spent on wind energy. Week 7 was spent on the role of energy in agriculture. The final week was a review.

Each student in the class chose a hands-on project to compliment the class discussions and readings. The projects included the construction of a solar food drier and completion of the solar hot water heater started in Spring Term.

A Selected Bibliography

Enertech Corporation. Planning a Wind-Powered Generating System. N.p.p.: Enertech Corp., 1977.

Gyorgy, Anna, et al. Everyone's Guide to Nuclear Power. Boston, Massachusetts: South End Press, 1979.

Martin, William Z., et al. Growth and its Implications for the Future. N.p.p.: The Dinosaur Press, 1975.

Mazria, Eduard. The Passive Solar Energy Book. Emmaus, Pennsylvania: Rodale Press, 1979.

Wallace, Daniel, editor. Energy We Can Live With. Emmaus, Pennsylvania: Rodale Press, 1976.

Periodicals:

Solar Greenhouse Digest

Solar Age

Mother Earth News

Solar Heating and Cooling

Popular Science

Alternative Sources of Energy

Esquire

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CARPENTRY

This course was designed to teach the fundamentals of basic house construction. It involved the construction of various buildings and utilized all aspects of on site construction: site selection, planning, framing, finishing, material selection and suitability of design to use. Enrollment was limited.

Excerpts from Teacher Comments

The various projects that we have attempted in the carpentry class have given a representative taste of all-around on-site work. After getting acquainted and accustommed to the various tools, the students moved out into the field to put them to practical use. Our first job was designing, building, and hanging barn doors. We also built and hung a sound proof door for the music room. With the Alternative Energy class we collaborated in the building and design of a solar food dryer that will serve as a model for future units.

In the building of a porch the class is learning all the facets of basic construction: laying out and pouring the foundation, structural design, tying into an existing building,

Teacher Comments, continued

framing, and the making of stairs (utilizing the framing square).

For extra credit, students are involved with designing the following: a self-sufficient house, an enclosed elevated porch, and a solar water heater - all of which correspond to other work they are doing in Homesteading and Alternate Energy.

Selected Bibliography

Brann, Donald. How to Build a Stable. Briarcliff Manor, New York: Directions Simplified, Inc., 1973.

Hunt, W. Ben. How to Build and Furnish a Log Cabin. New York: Collier Books, Macmillan & Co., 1974.

Leavy, Herbert T. Successful Small Farms: Building Plans and Methods. Farmington, Michigan: Structures Publishing Co., 1978.

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GARDENING

The class maintained and harvested the garden planted in the Spring, and prepared wide raised beds for intensive plantings. Principles of plant nutrition, soil health, and composting were covered. The textbook was John Jeavons' How to Grow More Vegetables than you ever thought possible on less land than you can imagine. Evaluation was based on class participation.

Excerpts from Teacher Comments

Gardening was run as a self-reliance activity this summer rather than as a course. The emphasis this term was on harvesting and marketing. Students learned how to identify each vegetable at its peak, and to crop, wash, sort, pack and keep accurate records. We were marketing primarily to the school's kitchen, but had a surplus of lettuce which we sold to local restaurants.

Selling commercially was definitely a high point for the students; the enthusiasm of the chefs for the superior quality of the produce was very encouraging. Next season I hope we can increase our marketing to restaurants and retail outlets, and sell flowers as well.

Excerpts from Teacher Comments, continued

The dome greenhouse provided a very valuable comparison of field grown tomatoes with those grown under cover. It was also interesting to compare yields of our wide bed, intensive plantings with those of our farmer's traditional row crops; no absolute data is available for this because of different planting dates and amounts planted. However, preliminary observations indicate that intensive plantings yield at least triple the amount of crops per square foot of garden planted.

A Selected Bibliography

Jeavons, John. How to Grow More Vegetables than you ever thought possible on less land than you can imagine. Palo Alto, California: Ecology Action of the Midpeninsula, 1974.

HOMESTEADING

This hands-on course was designed to teach some basic homesteading skills. Some of the topics covered were cheese-making (hard and ricotta), putting food by, keeping chickens and pigs, and using herbs as home remedies. The course included many field trips. A paper or project was required, and it was expected that each student keep a journal of his/her experiences and learnings within the class.

A Selected Bibliography

Primary Text:

Jean Tetrault and Sherry Thomas. Country Women: A Handbook for the New Farmer. New York: Doubleday, n.d.

Others:

Garden Way bulletins.

Emery, Carla. The Old-Fashioned Recipe Book: The Encyclopedia of Country Living. New York: Bantam Books, Inc., 1977.

Logsdon, Gene. Homesteading: How to Find New Independence on the Land. Emmaus, Pennsylvania: Rodale Press, Inc., 1973.

A Selected Bibliography, continued

Robinson, Carolyn and Robinson, Eds. The Have-More Plan. Charlotte, Vermont: Garden Way Publications, 1973.

Robinson, David. The Complete Homesteading Book: Proven Methods for Self-Sufficient Living. Charlotte, Vermont: Garden Way Publications, 1974.

Vivian, John. The Manual of Practical Homesteading. Emmaus, Pennsylvania: Rodale Press, Inc., 1977.

(All Student Projects Were Photodocumented.)

Field Trips

1. Trip to local commune to see three hand-built log cabins - and to talk with people about clearing land, cutting trees, building (design), etc. - saw gardens - a battery run T.V. - outhouses, etc.

2. Trip to local family's log cabin - talk on solar (mostly passive solar) energy techniques by architect there. Saw chicken set-up, wood stoves, composting toilets.

3. Trip to Vermont Institute of Natural Science to see hot water heater, special solar windows and curtains, and files on solar energy.

4. Trip to local wood stove business to talk about wood and coal heat and to see stoves and furnaces.

5. Trip to see local log cabin built 36 years ago in South Woodstock. The woodworker who built it talked about its building.

6. Trip to earth insulated house in Lyme, New Hampshire, by leading architect.

7. Talk by Structures teacher on building of Woodstock Country School log cabin.

8. Talk by Alternate Energy teacher on alternative energy for the homestead, including methane, wood, solar, wind and water power.

9. Trip to local homestead to see a small homestead sufficiency - goat, pig, garden, herbs, chickens, rabbits, broilers and pottery studio. The homesteader is from Czechoslavakia and has an amazing set-up - the students were overwhelmed. He showed us a way of moving huge boulders on rolling logs.

10. Other projects were: working in the garden, composting, felling trees, using chain saws, splitting wood, freezing vegetables, milking goats, photo-documenting school self-sufficiency projects, projects on categorizing various woods (BTU's), homestead plans, etc.

SHEEP TO SHAWL

This course was designed to teach basic sheep farming, and to cover all aspects: fencing, history, feeding, lambing, shearing, parasite control, pastures, etc. Students also learned about: spinning on an Ashford spinning wheel, vegetable dyeing, plying yarn, and tanning hides. Field work and a project or paper were expected from each student.

Excerpt from Teacher Comments

This was the first time that a student truly did do sheep to shawl: spun the wool, and wore the shawl - did a beautiful job at that. All projects were photodocumented. Students did these projects: working with the sheep, worming, flushing for breeding, selling all lambs, moving lambs and sheep to other farms, carding, spinning and weaving.

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A Selected Bibliography

Adrosko, Rita J. Natural Dyes and Home Dyeing. New York: Dover Publishing, Inc., 1971.

Bradbury, Margaret. The Shepherd's Guidebook: Raising Sheep for Meat, Wool, and Hides. Emmaus, Pennsylvania: Rodale Press, Inc., 1977.

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Sheep Canada

The Shepherd Magazine

Shuttle, Spindle, and Dyepot

U.S. Dept. of Agriculture Bulletins